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PENNSYLVANIA PLANNING

DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

AUGUST 1941

INDEX OF PUBLICATIONS

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P38.4

COMMONWEALTH OF PENNSYLVANIA

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

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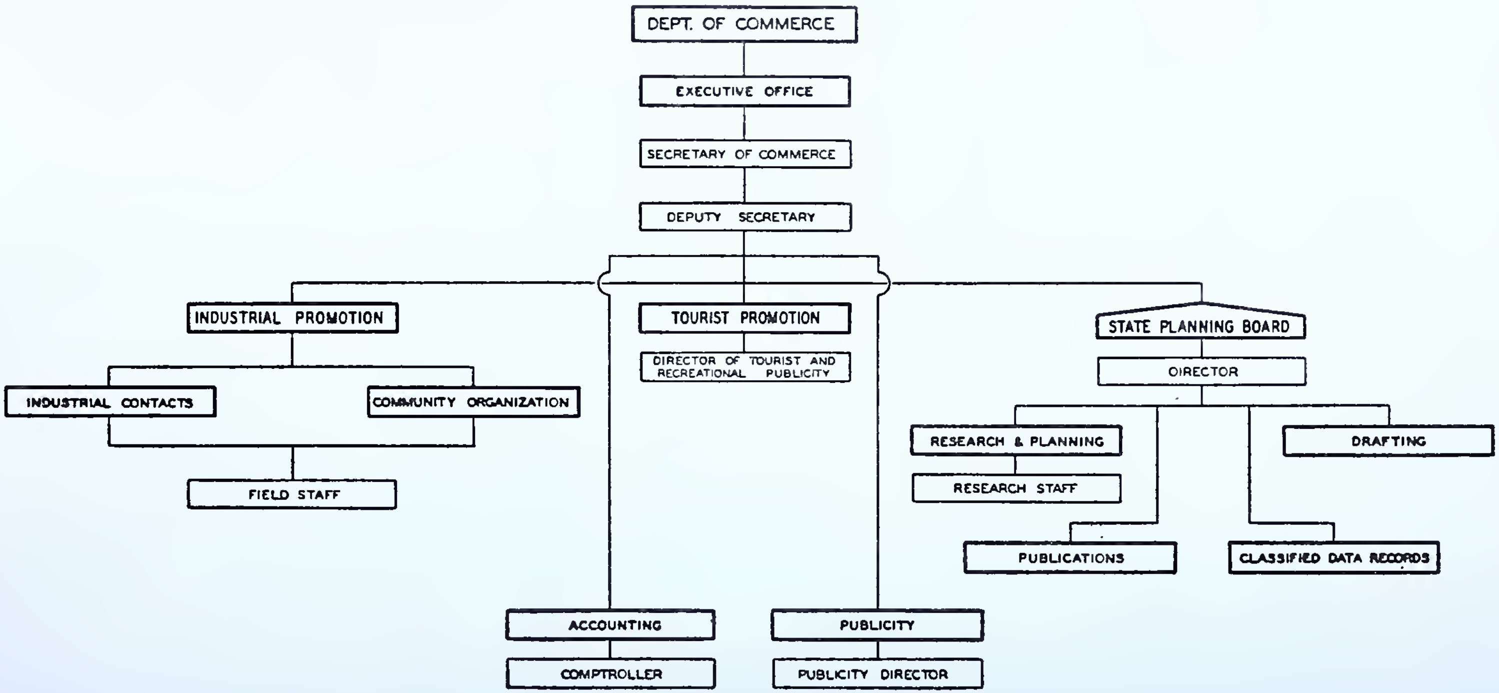
FUNCTIONAL PLAN OF ORGANIZATION OF THE DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA



A Six Year Record

At the time of the creation of the Pennsylvania State Planning Board, any form of State Planning was relatively new in the United States. American economic growth had been so rapid during the hundred years which culminated in the great boom of the 1920's that any need for dealing with the consequences of that growth was rarely perceived.

The development of our cities had proceeded on lines dictated largely by necessity, and despite the early example of Washington and Philadelphia few American cities had ever devised any consistent plan for their efficient and economical growth.

The perfection of the automobile, and the consequent rapid shifts in the character of urban neighborhoods finally forced on city dwellers the necessity for some form of control of business, industrial and residential development. It has been estimated that in the past generation property losses occasioned by needless changes in types of use cost owners of American city property more than their total losses by fire.

Such facts, gradually realized by urban communities, have over the past twenty years, compelled most American cities to adopt planning and zoning laws. It was not, however, until the beginning of the great depression that the idea of planning in the interest of the economic and social development of an entire sovereign state gained any acceptance in American government. The wreckage of the depression, the consequences of uncontrolled and unplanned industrial growth and of ill-informed public expenditure based on boom time psychology finally forced the legislators of many of our states to recognize the urgent need for better information, and better coordination of their resources for the protection of their citizens and in the interest of economy and government. Extravagant estimates of future population growth had frequently misled great cities into enormous increases in their local debt, while school facilities had in some communities lagged hopelessly behind the needs of their people. In other areas, expensive programs of public building had been undertaken to meet conditions which any careful study of the composition of population and of prevailing birth rates would have revealed were destined rapidly to change.*

Highways developed along routes of early horse and buggy

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* Estimates made by the Planning Board in 1935 indicated for 1940 a population of 9,857,400 in Pennsylvania, which is within one-half of one percent of the total enumerated by the U. S. Census in 1940.

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travel contained bottlenecks which slowed and endangered all travel along their length. The unrestrained development of roadside commerce was destroying the natural beauty of many of the most outstanding scenic areas of our nation. Erosion was wasting the treasures of our soil. Submarginal agriculture was throwing heavy burdens for schools and services on rural counties least able to bear this load.

No one of these consequences of the rapid progress of the past might of itself have been enough to encourage us to better planning for the next stages of our growth had not the deep depression which began in 1930 strained all our national resources almost to the breaking point and compelled us to take thought for our own self-protection.

In those critical years it was perceived that the slowing up of the growth of our national population, the increase in technological unemployment, the migrations of people and industry, in addition to the debts and other burdens inherited from our period of furious growth, compelled every city and borough, as well as every sovereign state, to take stock of its position, and to attempt to recover its losses, however it could.

Beginning with New York and Wisconsin, one by one every state in our Union undertook, in the darkest days of that depression, to begin a program of self-examination and state planning. Pennsylvania was among the earliest in undertaking this task and has remained among the foremost in executing it.

The problems which had to be faced were many. These were of two kinds—first those which related to our livelihood, to the industry and commerce of our State, the problems of anthracite and bituminous coal, of steel and iron, and cement and glass—the problems of stimulating our manufactures and of securing employment for our people, and of the conservation of our soil, our forests, and our mineral resources. The second class of problems related to our living—to our comfort, protection and satisfaction in the Pennsylvania way of life. At basis the two problems are inseparable, but their emphasis is not the same.

The need of our people for healthful recreation, for adequate, well-planned highways, for proper housing, for abundant supplies of pure water, and also for protection from flood and drought, are all essential parts of this phase of state planning. Other problems such as that of the protection of the scenic beauties of the State equally concern our livelihood and our satisfactions.

It is interesting to note that in its first official publication in 1934 the Pennsylvania State Planning Board, departing from all precedents that State Planning was exclusively a matter of land use, considered every question so far referred to, those bearing upon the needs of the commerce, mining and manufactures of our State, as well as those covering the protection of our resources and the satisfaction of our people in their ways of life.

Its second and third research reports considered the recreational needs and facilities of our State. Its fourth report (released March, 1935) is entitled "A Proposed All-Weather Highway (including a History of the South Pennsylvania Railroad)." This pioneer proposal and endorsement of a protected highway between Harrisburg and Pittsburgh, with information as to the route along the old right-of-way of the South Pennsylvania railroad was received with some skepticism at the time of its publication, now nearly six years ago, but was the first public endorsement by any agency of the State government of the enterprise which has lately provided Pennsylvania with the finest modern highway in the world.

Very shortly after this publication the Planning Board undertook a survey of all needed and possible emergency landing fields in our State (Report No. 5, April, 1935).

This was followed by a detailed report on the manufacturing and agricultural employment and returns prevailing in the State during the mid years of the depression, and of the population movements into and out of the 67 counties (Report No. 6 entitled "Pennsylvania Subsistence Homesteads").

Following these studies the Planning Board began a study of certain agricultural counties. It compiled an estimate of the population growth of the State since 1930, began its examination of the coal problem of the State, and of its conditions contributing to tax delinquency in our least settled counties, and also compiled, with the help of all State Departments, an estimate of a ten-year program of needed public works.

Following its population studies it investigated the supply and demand for teachers in the public schools (Report 24). In March, 1936, at the request of the Governor was issued a "Proposed Flood Control Program for Pennsylvania," which was followed by a series of studies of all the drainage basins of our State.

These studies first issued separately were finally combined in three volumes, "Drainage Basin Study of Pennsylvania," published in 1937.

Many other researches were undertaken in the interval, including one into the Motor Vehicle Transportation of the State, and various studies as to mapping and survey problems which finally led to the proposal for the Air Mapping of Pennsylvania which has been carried out in cooperation with other State Departments and the U. S. Department of Agriculture.

Because depression conditions had caused great distress in many of our rural counties, a study of those areas in our State suffering most from economic handicaps was completed in 1937 and entitled "Problem Areas in Pennsylvania." One county was then made the subject of a special study, as a demonstration of the method by which local problems could be examined in detail by the citizens of counties experiencing economic difficulties.

This study, "Cameron County—An Analysis of Problems," was also published in 1937.

Parallel to these researches was a continuous effort to encourage the planning and zoning of Pennsylvania's civil divisions.

This has been a continuous task and concern of the Planning Board from the period of its organization. The Board has been instrumental in presenting to the legislature the need for enabling laws empowering local authorities in all types of civil divisions to plan and zone their growth in the interest of roadside improvement, of stable real estate values, and of better living conditions for all the State's inhabitants.

Three publications of the Board are directly addressed to this purpose:

"Planning and Zoning — Powers and Procedures."

Volume I on County and Regional Planning and Zoning and on Zoning of Second-Class Townships (1938).

Volume II on the Planning and Zoning of Cities, Boroughs and First-Class Townships (1938).

Volume III "The Pennsylvania Zoning Primer," published in 1940.

Studies begun in 1937 as to the localization and migration of the manufacturing establishments of our State have been continued to the present date.

Since the passage of the State Commerce Act of 1939, by which the Planning Board was incorporated into the Department of Commerce, much of the activity of the Board has been devoted to a continuance and broadening of its industrial studies.

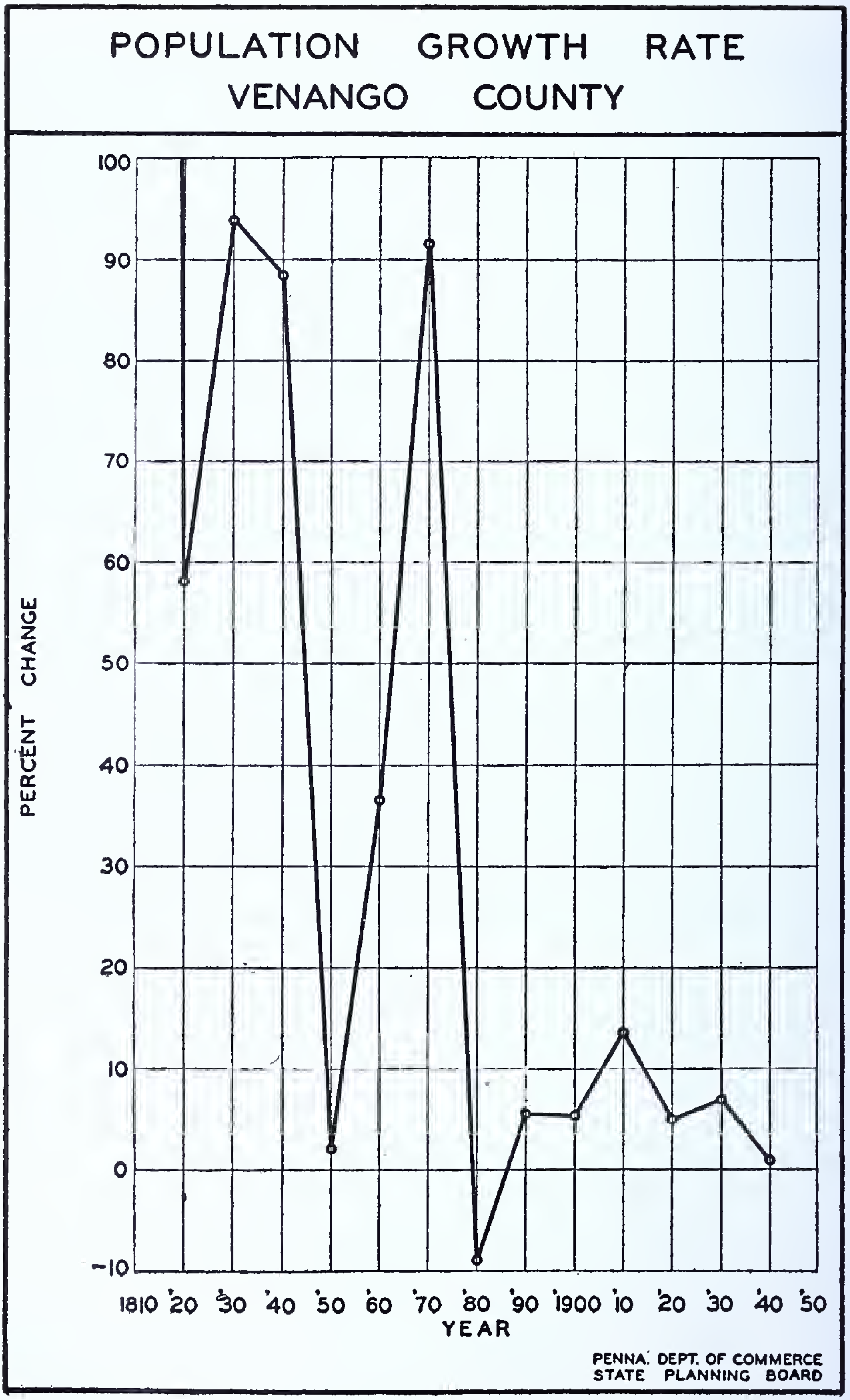
It has engaged in an investigation of the Bituminous and Anthracite Coal Industry and of the effects of war conditions upon Pennsylvania's commerce and production. It has supplied a considerable fund of data upon Pennsylvania's industrial opportunities, and under the direction of the Secretary of Commerce has provided contacts between the State's manufacturers and agents or consumers in foreign lands—particularly in Latin America, and has answered a great variety of queries as to industrial locations and opportunities in our State.

Under the industrial development program of the Department of Commerce it has compiled and is maintaining an inventory of vacant industrial establishments, and as an aid to Pennsylvania production for national defense it maintains an index by locality of all defense orders allocated to Pennsylvania. In addition to these and other directions of effort associated with the program of the Department of Commerce, the Planning Board has continued to maintain its promotion of local planning and zoning, and its study of the population movements of the State. It has made periodic estimates as to the extent and distribution of our population growth, has engaged in studies as to recreation needs, transportation, roadside developments and their control, local finance, and employment.

In 1937 the Board began the publication of a monthly bulletin "Pennsylvania Planning," in which many of the results of its recent researches have been first presented.

This necessarily very brief review of the Board's activities omits any account of many of the functions which it carries out under the provisions of the State Planning Board Law, including its various coordinating activities. The purpose has rather been to indicate here the extent of the information already gained and its utility to the public and to the General Assembly as a source of impartial data.

With this end in view we are presenting a survey of the data series now being maintained in its office and its library, of the charts and maps on file, and also, in the final pages of this issue, a survey and a general index of its publications to date.



The growth rates here shown reveal the effect of Pennsylvania's oil industry on this country's population growth.

Data and Services

The chief purpose of a state planning program is to provide the people of the Commonwealth and their representatives and agencies with a basis for both immediate and long-range action to promote the welfare of the State. The coordination of the various efforts for the State's welfare in all fields of endeavor, which includes transportation, production, commerce, land use, recreation, and scenic protection, and in the control and conservation of the total resources of population and labor, of minerals and of land, of timber and fuel, is the large but unmistakable task of state planning.

In this endeavor it has been necessary to accumulate and organize much information not readily available to the general public, and also to collect and compile certain data in a form never accessible before.

The following very abbreviated summary of information maintained by the Board is presented for the information of the public and the General Assembly as to sources or types of data which bear upon the State's general problems and which might otherwise be difficult to procure.

The data now available as a result of the researches and activities of the Planning Board fall into three general groups—those concerning the physical problems of the State, those concerning its social problems, and those concerning its industrial and commercial problems.

Foremost among the items throwing light upon the land use, transportation and location problems of communities and industries is the Board's virtually completed collection of air photographs, which to date covers nearly 37,000 square miles of the State's territory (See Pennsylvania Planning, November, 1940). These photographs reveal the highways, the forested areas, the land use, the types of agriculture, the areas of erosion, the recreational and industrial possibilities of every county and every community in our State. They are being used as a basis for town or county maps, for the location of industrial plants, and in preliminary surveys for highway projects as well as in many other ways. In connection with the various indices and records of population growth, water supply, transportation, industrial and marketing activity, and surrounding land use available from data maintained by the Board, they provide an invaluable aid to all local and state planning programs and to all industrial and commercial development projects.

Data and data series maintained by the Board and providing information as to the land uses and resources of the State are briefly indicated by the following summary:

Agriculture

1. Number and size of farms.
2. Amount of farm land in various uses.
3. Farm income and expenditure.
4. Value of farm land and buildings.
5. Farm productivity.
6. Land classification.

All of the above by minor civil divisions.

Land Use

1. Public Land in Pennsylvania, by ownership and amount (all civil divisions).
2. Land classification by counties.
3. Estimated true valuation of taxable real estate.
4. Township areas.
5. Township road mileage.
6. Amount of State Forest and Game Lands (all civil divisions).
7. State Park and Recreational Study for 33 areas.
8. Recreational Land Use maps and data (all recreational areas).

Natural Resources

1. Anthracite and Bituminous Coal—factors of production and distribution peculiar to our State.
2. Sources of American fuel energy.
3. Water resources including data by minor civil divisions on water resources and needs for all minor and major drainage systems of the State.

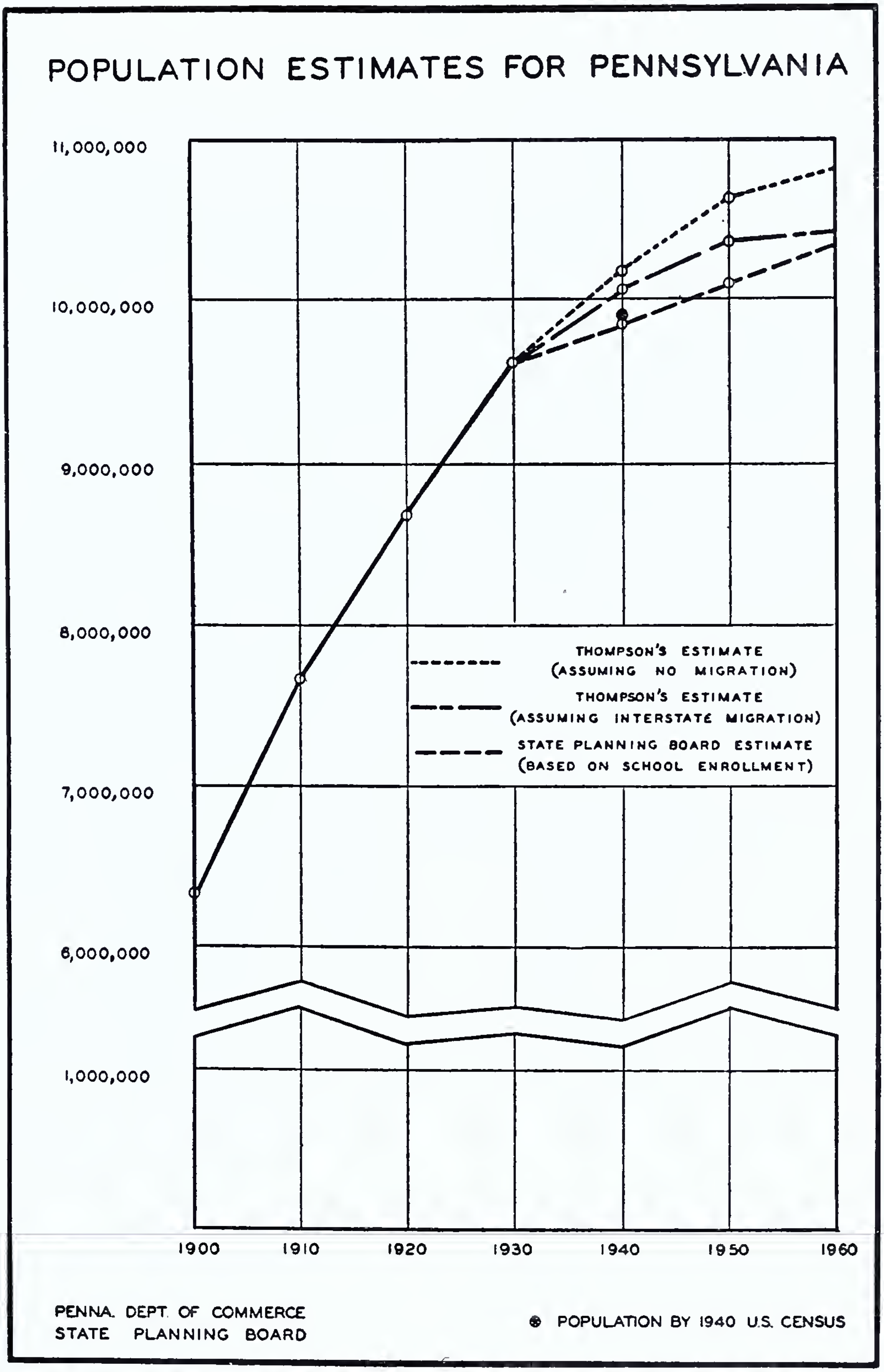
SOCIAL DATA

Taxation

1. Local tax levied per capita in all minor civil divisions.
2. Local taxes levied and the amount unpaid, 1926-34, by counties and minor civil divisions.
3. Real property tax rates in mills, 1939, by classes of taxation, crude and adjusted, for all civil divisions.

Population

1. Occupation, nativity, sex and age distribution.
2. Population estimated by minor civil divisions, 1933, 1934, 1935, 1937.
3. Population density ranked by minor civil divisions.
4. Population growth by counties and minor civil divisions.



The estimates illustrated in this graph were made in 1935. That of the State Planning Board for 1940 made five years in advance differed from the 1940 census by less than one-half of one per cent.

5. Population growth rates by counties, 1790-1940.
6. Population estimates by age groups.
7. Population growth factors by counties.
8. Family sizes by counties, 1910, 1920, 1930.

(These items are being brought up-to-date as rapidly as the 1940 census data becomes available).

Planning and Zoning

1. Index of all State laws implementing planning, zoning, recreational activities, subdivision control, highway control and building control.
2. Index of local planning and zoning bodies in Pennsylvania.

Local Government Finance

1. Gross and net debt (all civil divisions).
2. Assessed and true valuation (all civil divisions).
3. Township receipts and expenditures.
4. Township administration costs.
5. City and borough source of all receipts and expenditures, by types and amounts per capita.
6. School financial data source of all receipts and expenditures, by types and per pupil (all civil divisions).
7. Extent of bonded indebtedness and its relationship to legal maximums for all larger communities in Pennsylvania.

(The data gathered on local government finance represent two years' work assisted by a W. P. A. clerical force.)

INDUSTRIAL AND COMMERCIAL DATA

1. Defense contracts in Pennsylvania—Indexed by counties and civil divisions and by product.
2. Inventory of vacant industrial establishments.
3. Trends in Pennsylvania manufacturing and extractive industries, by counties and industries.

   Operating charges, employment, compensation and localization. Also comparison with other states. All industries.

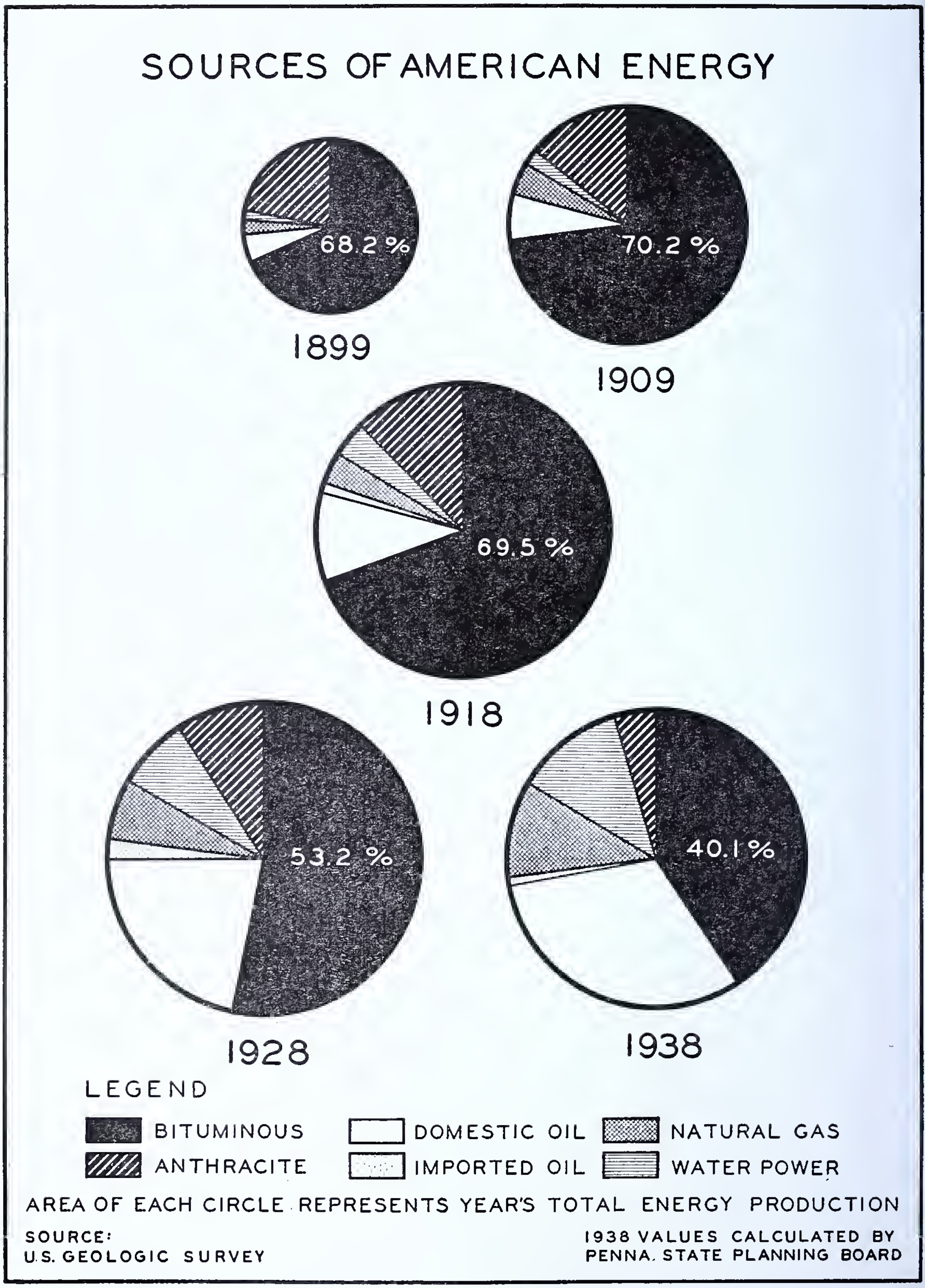
   (The accumulation of these data represent more than three years' continuous work, assisted by a considerable W. P. A. clerical force.)
4. Labor turnover in manufacturing employment.
5. Summary of unemployed employables on public relief.

6. Transfers of automobile license plates in Pennsylvania.
   (An index of sales activity and purchasing power.)

In addition to such data series the Planning Board possesses a very extensive collection of special information on foreign trade, on the effect of trade agreements on Pennsylvania industries, and on the commerce of our ports, and a large body of information on various industries and natural resources important in our State, such as coal and steel, and textiles. Its extensive collection of maps and charts illustrates many of these studies and is available for consultation, and for use through blue prints or photostats.

Supplementing such information gathered in the course of the researches of the Board, its reference and research library contains many thousand classified items providing economic, social, and land use data fundamental to planning and industrial programs for the State or its divisions.

The Planning Board is prepared to provide data for counties, and in many cases for minor civil divisions, on all major factors influencing local welfare, such as land use, population, employment, industry and commerce.


SOURCES OF AMERICAN ENERGY

AREA OF EACH CIRCLE REPRESENTS YEAR'S TOTAL ENERGY PRODUCTION

SOURCE:
U.S. GEOLOGIC SURVEY

1938 VALUES CALCULATED BY
PENNA. STATE PLANNING BOARD

Publications and Reports

PRELIMINARY REPORT, DECEMBER, 1934

The Preliminary Report of the Pennsylvania State Planning Board, a publication of 682 pages, presented the first results of the Planning Board's survey of the problems confronting the people and the government of our Commonwealth. Though much of the data embodied in this extensive examination of the manifold activities and interests of the people of our State must be supplemented by later information, this volume remains the most comprehensive summary of Pennsylvania's resources in men and things yet published for the information of our citizens and their agencies.

Amplifying and maintaining the data contained in this volume has been a considerable part of the primary duties undertaken by the State Planning Board during the course of its activities. These data extended in greater detail as to the problems of population, land use, employment, living conditions, industry, trade and transportation comprise the material upon which intelligent action for the present and future has to be based.

This volume is extensively illustrated with charts, maps and halftone cuts, many of which still represent the best available information to date as to our State's resources.

The Report is prefaced with a statement of the chief findings of the Planning Board's first survey. After the lapse of six years these preliminary findings still form a dependable basic statement of the outstanding needs and most important tendencies in our Commonwealth's industrial and social development. The preface also contains a series of thirty-seven recommendations for improving the position of the State's industry and commerce, and for the development of its educational and recreational services, for the better utilization of its land, for the improved administration and financial stability of its civil divisions, and for its research needs.

Some twenty-five of these recommendations have since been adopted by law or otherwise made effective

The report contains a number of chapters supplied by leading authorities in various branches of knowledge as to specific conditions in our Commonwealth. A brief summary of its chapters and their contents follows. More detailed information as to many of the items contained in this report may be obtained from the general index of the Planning Board's publications, included in this number of *Pennsylvania Planning.*

Population.—In this chapter the growth, composition, and distribution of population in our State, are discussed at length. The consequences of the growth of urban population in the past three decades and of the changes in age distribution as revealed by the census of 1930 are emphasized. The problem of migration between various parts of the State and into and out of the State is dealt with in some detail. These movements are particularly important to Pennsylvania which has supplied to other states so many inhabitants. The future population of Pennsylvania is estimated by decades to 1960.

Physiography.—This chapter deals with the geographic history and the land surface regions of the various sections of our State, with their agricultural characteristics, with the drainage and the drainage basins, the climate, the temperature and the rainfall of each physiographic area.

Agriculture.—This chapter, prepared by David H. Walter, Land Planning Consultant for Pennsylvania, National Resources Planning Board, discusses the soil, the marketing problems, the crops, and livestock of our State as well as the trends in land use. It provides data as to our farm output, the extent of our crop lands and their yield and as to the land use problems peculiar to our agriculture. It also deals with and illustrates the various types of soil erosion and their remedy. It considers the problem of abandoned farm land and sub-marginal farm land and the effect of sub-marginal agriculture on population and income.

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Forest Land as a Basic Resource.—This chapter which was prepared by E. A. Zeigler, D.Sc., Director, Forest Research Institute, Department of Forests and Waters, deals with the necessity of long-term planning for the conservation of Pennsylvania's forest resources. The status of the forest industry and the available and future supply of standing timber in Pennsylvania are discussed as well as the association between forest areas and tax delinquency. The use of forest lands as park and recreational areas and their importance for game conservation are considered at length. A State forest program for Pennsylvania is developed at the close of the chapter.

Water Resources.—This chapter is abridged from a report by Charles E. Ryder, C.E., Chief Engineer, Water Resources Board, Department of Forests and Waters. It deals with the precipitation, the surface run-off and the ground water of Pennsylvania, with types of drought, with the lakes and ponds and storage reservoirs of our State, with industrial water supply, and with hydroelectric power. It contains a section on floods and flood control and one on the State administration of water.

Public Water Supplies.—This chapter was prepared by W. L. Stevenson, Chief Engineer, Pennsylvania Department of Health, and deals with the supply and purification of the drinking water of the State and with problems of filtration and sewage disposal. It also considers the disposal of industrial waste and the legislation and agreements made in the interest of the control of pollution in the streams of our State, and deals at length with those studies and activities now being conducted for the protection of the drinking water of our Commonwealth.

Mineral Resources.—This chapter is an abridgement of a survey by Raymond E. Murphy, Ph.D., Associate Professor of Economic Geography, School of Mineral Industries, Pennsylvania State College. It emphasizes the great importance to the nation of Pennsylvania's mineral resources. This chapter is necessarily but an introduction to the very much larger body of data afterwards accumulated by the Planning Board as to the mineral resources of our State. It discusses the importance of Pennsylvania's coal production and the peculiar problems that have faced the coal producers of our State in the past twenty years. It also deals with coke production, and with petroleum and natural gas, and emphasizes the economic importance of the peculiar characteristics of Pennsylvania's crude oil. The portland cement industry, the rock and clay production of our State, and our iron and steel industry are discussed in this section of the report as well as the influences tending toward decentralization and the shifting of the centers of production of the ferrous metals.

Economic and Geographic Regions of Pennsylvania.—This chapter was contributed by Raymond E. Murphy, Ph.D., of Pennsylvania State College. It describes the various economic and agricultural regions of our State.

Planning for Reasonable Comfort.—This chapter deals with the cost of living in Pennsylvania, with the income of Pennsylvanians, and with the income necessary to provide each inhabitant of the State with adequate food, clothes, and shelter. It represents an attempt to discover what level of income would be required to provide all Pennsylvanians with adequate living standards and with at least a minimum of recreation and amusement.

Coping With Pennsylvania's Changing Working Conditions.—This chapter, by Elizabeth S. Johnson, Department of Labor and Industry, is a study of employment and unemployment in Pennsylvania and of the working conditions of Pennsylvania's labor. It deals with accidents, and accident prevention, with the decline of child labor, and with working hours and earnings. It discusses the effects of depression conditions on labor relations, income, and employment, and embodies seven recommendations, many of which have since been adopted for the improvement of labor relations in our State.

Housing.—This chapter deals with housing needs of the State, both urban and rural, with types of dwellings in various cities and in the rural areas, with the housing facilities enjoyed by our people, and with the sanitary conditions of their dwellings. The problem of urban blight and the effect of population movements on housing needs are here considered, as well as the problems of the building industry as they bear upon the possibility of privately financed domestic construction supplying the urgent need for low-cost dwellings.

Social Security.—This chapter was based in part on a report by W. C. Plummer, Ph.D., Professor of Economics, University of Pennsylvania. It deals with the various types of social security which at the time the chapter was written and published were being considered to protect the people of our State.

Workmen's Compensation. — This chapter, based on a report prepared under the direction of the Governor's Committee on Workmen's Compensation, discusses the defects in the then prevailing law for protection of the laborers of our State.

Public Works.—Abridged from a report of W. N. Loucks, Ph.D., Assistant Professor of Economics, University of Pennsylvania, this chapter discusses the possibility of long-range planning programs of public works as a stabilizing device to provide employment during periods of emergency due to economic depressions.

Manufacturing and Trade.—Pennsylvania ranks second of the manufacturing states of our Union. The growth of our manufacturing industries, the problems of technological unemployment, the relative importance of the various types of industries and their distribution among the counties of our State are all discussed in this chapter. Data is given as to the migration and decentralization of industry, as to retail sales and occupational trends.

Retail Distribution.—In this chapter the retail and wholesale distribution of Pennsylvania, the credit business, and the chain store problem are all discussed at some length. The chapter also includes an analysis of selected areas of retail distribution and discusses the influences working toward changes in the distribution pattern of our State and in the buying habits of our people.

Transportation in Pennsylvania.—Prepared in cooperation with G. Lloyd Wilson, Ph.D., Professor of Commerce and Transportation, University of Pennsylvania, this chapter embodies a survey of our present transportation facilities, including highways, railroads, inland waterways, airways, and pipe lines. It also contains a discussion of motor-vehicle accidents in our State and deals with the necessity for roadside improvement. It emphasizes the need for coordination of all our transportation facilities so that they may better serve the needs of our people.

Electric Power and Its Development.—The electric power capacity and consumption in our State, which even in 1927 totalled nearly 12 billion kilowatt hours, is discussed in this section of the report. A summary of the principal hydroelectric plant locations, of their capacity, and a comparison of their output with that of steam plants is embodied in its text. The chapter also discusses the transmission and distribution of electric power, the growth of industrial consumption of electric energy, and the problems of rural electrification. It points out the necessity for a sound plan for the development of Pennsylvania's power resources fitting into long-range regional plans based on the movements of population and industry.

State Government.—Based in part on a report by Bradford W. West, Ph.D., Wharton School of Finance and Commerce, University of Pennsylvania, *et al.*, this chapter turns to the discussion of our State's governmental structure, the type of civil division, the basis for their creation, and the various functions or each governmental unit. Problems of administration, personnel, and finance as affecting local government units are here outlined as well as suggestions for improvement in administration and financial control of the various civil divisons.

A Planned Program of Public Education for Pennsylvania.—This section of the report was prepared by A. W. Castle, Director Extension Education, Department of Public Instruction. It discusses the 10-year prospect for Pennsylvania education, the prospect for high and grammer school enrollment over that period and the expected enrollment in colleges and universities. It considers the problems of the unemployed youth and of those who do not enter institutions of higher learning. It offers a plan for progressive improvement in the school curricula, and for an adjustment of teacher preparation to the probable future demand. It suggests larger administrative units for our rural schools so that all communities can provide their children with complete educational advantages with a reduction of operating costs.

School Finance.—This section of the report was prepared by D. E. Crosley, Deputy Superintendent in Charge of the Administration of Finance, Pennsylvania Department of Public Instruction. Dr. Crosley, in this section of the chapter on education, deals with the cost of education per pupil in various types of public schools in the rural and urban areas of our State and with the State's responsibility for financial aid to distressed school districts. The chapter embodies a series of recommendations for the development of our educational program over the ensuing 10 years.

A Plan for the Development of Pennsylvania Libraries.—This chapter was prepared under the supervision of the State Planning Committee of the Pennsylvania State Library Association. It deals with Pennsylvania's library needs which have become emphasized by the increased leisure of our people. It points out that a large number of Pennsylvanians are without library services of any kind and recommends the extension of State aid to our rural communities for the establishment of adequate library facilities. It also points out the advantages that can be attained by rural communities under our present county library law.

Public Social Welfare.—Prepared from material assembled by the Pennsylvania Department of Welfare, this section of the report deals with the mental health program, with the hospitals for mental defectives and with the need for organized research activities directed toward a program for the prevention and cure of mental disability. It deals also with the child welfare program of our State, with the various forms of relief to the aged and poor, and with the State's correctional institutions. One section of this chapter is devoted to the problem of probation.

Planning the Reorganization of Relief in Pennsylvania.—Prepared from information provided by Arthur Dunham, Secretary, Family and Child Welfare Division, Public Charities Association of Pennsylvania, and by Mrs. Gertrude M. Williams, Pennsylvania Department of Welfare, this chapter is devoted to a consideration of the means that may be adopted to coordinate the six varying forms of public relief now operating in our State.

A STANDARD SYSTEM OF PLANE COORDINATES FOR PENNSYLVANIA, JANUARY, 1936. A STANDARD SYSTEM OF PLANE COORDINATES FOR PENNSYLVANIA, NON-TECHNICAL EXPLANATION, DECEMBER, 1936.

The second and third publications of the Planning Board were devoted to a problem encountered early in the researches of the Board—the lack of an exact and uniform system for the mapping of the areas of the State. It was discovered that because of a lack of convenient reference points, and as a consequence of the various systems used in the past for establishing locations, the boundaries and survey lines within our State were subject to much confusion. To remedy this condition and to place the surveying and mapping methods of the State on a modern and exact basis it was proposed that the State Legislature establish a system of plane coordinates for Pennsylvania, the administration of the system and of the necessary further surveying to be under the direction of the Department of Internal Affairs.

These reports contain a technical and non-technical explanation of how such a system can be used for the exact determination of all property and boundary lines by reference to locations exactly established by the U. S. Geodetic Survey.

The legislation recommended in these reports was enacted by the 1937 session of the General Assembly. After the enactment of this legislation, the Secretary of Internal Affairs requested suggestions from the State Planning Board in regard to the new duties of the Department of Internal Affairs in connection with the Plane Coordinate System. The Board's recommendations were given in a report entitled "Proposed Bureau of Surveys and Maps, 1937."

THE STATUS OF MAPPING IN PENNSYLVANIA, 1936

This publication presents a comprehensive and completely illustrated survey of the types and extent of the mapping of our State by various governmental agencies. It points out the need for the various types of mapping and gives a schedule of costs for the completion of each type of mapping as well as giving recommendations as to priority. Included in this publication are recommendations in regard to the air photography program which has since been carried out through the cooperative agreement worked out by the State Planning Board between the United States Department of Agriculture and various State agencies.

PENNSYLVANIA, AN INVENTORY

Because of the demand for an abridged and popular presentation of the outstanding facts concerning our State's population, production, commerce, agriculture, natural resources and government which were presented in The Preliminary Report, this volume was prepared by the Planning Board in 1936 and published by the Department of Public Instruction for use by the teachers and pupils of the schools.

It is extensively illustrated with cuts made originally for the Board's Preliminary Report and is divided into three parts, one on Pennsylvania's Human Resources, one on its Natural Resources, and one on its Industrial Resources, thus presenting in simplified form the three-fold approach to State appraisal and planning which has guided the Board from its inception.

In the first section it undertakes to answer such questions as "Who are Pennsylvanians? Where do they live? How do they work? How are they trained for life? How do they govern themselves?" In the second section it propounds and answers such questions as "What is Pennsylvania? How does she use her farm lands, her forests, her waters, her minerals?" In the third section, "What do we make? How do we buy and sell? How do we move our goods?" and finally, "Where is Pennsylvania going?"

This volume has had a wide circulation.

PROBLEM AREAS IN PENNSYLVANIA (1937)

In this publication the Planning Board undertook to locate those sections of our State experiencing the most acute economic and social problems as a result of population losses, low agricultural productivity, tardy payment of taxes and other factors bearing upon the ability of their people to obtain adequate services or to find opportunity for their labor. The report sets certain criteria as a test for the existence of "problem conditions" and applies these tests to all the civil subdivisions of the Commonwealth. Several maps illustrate the relationship of such problem conditions to population density and the distribution of public land areas, and various diagrams illustrate the methods by which the problem areas were delimited. Several solutions for the types of problems discovered in this report are proposed in the text among which are zoning of such areas against definitely unprofitable types of land use, reforestation, and a gradual relocation of settlers in the interest of governmental economy.

CAMERON COUNTY, AN ANALYSIS OF PROBLEMS (1937)

In this report, a more detailed study with considerable field work, was made of one county of the State in which a large part of the area was occupied by public land. The resulting school, highway, taxation, and land use problems were examined in detail. This study was undertaken as an instance of the methods which must be followed for intelligent self-appraisal by rural counties encountering problems consequent to a scattered population. The recreational possibilities of the county were stressed and definite recommendations were made as to the improvement of land use, and economy in administration through the application of a county zoning law to the problems involved.

MUNICIPAL BORROWING POWER, DEBT AND EMPLOYMENT (1937)

This publication of the Board proposed that the legal borrowing power for the municipalities of the State be based on a nine-year moving average of taxable real estate values. Written by Dr. Karl Scholz, of the Department of Economics of the University of Pennsylvania, the report presents evidence that such a basis for municipal debt limitation would tend to expand municipal borrowing power for the construction of public works at times of low cost and unemployment, and to contract such borrowing power in periods of high-cost construction, whereas the prevailing system does the reverse and encourages larger expenditures at times when materials are most costly and unemployment is not a major problem.

DRAINAGE BASIN STUDIES (1937)

The three-volume Drainage Basin Study of Pennsylvania issued in 1937 was an extension of previous studies hereafter listed among the Planning Board's Research Reports.

In these volumes will be found detailed data concerning the drainage area, as well as the average and the greatest and least flow of every stream in our State. The rate of fall, sources of pollution, if any, types of erosion in the drainage area, and the extent of silting are also dealt with, as is the possibility of water-power development.

The present and future needs for drinking and industrial water supply, for irrigation and flood control, and for the rectification of existing water contamination are considered as to each sub-drainage basin as well as the recreational possibilities and wild life conservation needs along the waters of each major stream.

Lists of needed projects for water supply and flood control are listed for each drainage district in order of priority of need and tables are supplied showing for each civil division the estimated population and the water supply and sewage disposal facilities and needs.

The first volume of this Report includes the Pennsylvania portion of the sub-basins of the Delaware River, the Lehigh River, and the Schuylkill River; the second volume—the Susquehanna River, the Potomac River, the Genesee River, and Chesapeake Bay; the third volume—the Upper Ohio River, the Beaver River, and Lake Erie.

In all these drainage basin studies the important water consuming industries as well as the population of the regions concerned are listed and tabulated, and maps of the areas covered are included in each report, illustrating the topography of the basin, the type of water supply, the types of sewage disposal for each city, town, or borough in the district, as well as proposed flood control projects wherever such projects appear to be necessary.

PLANNING AND ZONING; POWERS AND PROCEDURES, VOLUME I (1938)

In this publication the Planning Board, carrying out the mandate of the State Planning Board Law (Section 7, Act 32, 1936), that "the State Planning Board shall cooperate with county, municipal and regional planning boards . . . and encourage and assist in their creation," issued the first of a series of three manuals on local planning and zoning.

Volume I is concerned with the legal authority for planning and zoning and the methods of instituting a program of carrying out that authority in counties, in second-class townships, and in regions of the State where such action would involve the cooperation of two or more civil subdivisions. As appendices to this volume are reprinted the County and Regional Planning Enabling Act, the County Zoning Enabling Act, the Second-Class

Townships Zoning Enabling Act, all three of which were sponsored by the State Planning Board and enacted during the 1937 session of the General Assembly.

PLANNING AND ZONING; POWERS AND PROCEDURES, VOLUME II (1938)

This volume stresses the importance of planning and zoning protection for the State's municipalities and outlines the legal and technical procedure which must be followed for the attainment of such protection. The problems of urban zoning and of the regulation and control of land subdivisions are discussed in this volume, which also deals with the planning and zoning authority of cities, boroughs and first-class townships.

The city, borough and first-class townships Planning and Zoning Enabling Acts are reprinted as appendices.

THE PENNSYLVANIA ZONING PRIMER (1940)

This brief volume, the third in the series on "Planning and Zoning; Powers and Procedures," is a nontechnical handbook covering the principles of zoning, whether for urban or rural areas. It embodies the experience of one of America's foremost town planners, as to the outstanding precautions to be taken in insuring the adequacy of a zoning law and in securing an efficient administration of such a law after it is enacted.

PENNSYLVANIA PLANNING

Begun in 1937, this monthly publication has continued for the past three and one-half years to present the findings of the Planning Board to the people of the State.

The first two years of this publication were devoted to the problems of State and local planning, enlarging and applying to specific problems information gathered through the researches of the Board's technical staff. Thus, *Volume I,* the first six months of this publication, was devoted to such problems of planning as those of highways, of drainage systems and of the need for better mapping of the State's land uses through air photography.

Volume II dealt with basic elements of planning, such as those involving housing, the recreational use of land, the timing of public works and the relation of that problem to employment during periods of depression and to the conservation of the State's resources.

Volume III dealt with the various levels of planning and the problems peculiar to each—such as those of cities, boroughs and rural areas.

Volume IV was largely concerned with statistical and other devices as applied to planning problems and with the use of maps and charts.

With *Volume V* more specific studies were published. This volume contains a Planning Directory of all agencies to which local authorities could turn for information on the various phases of their problems, a tabulated series of data for all counties of the State, data on the effect of age changes in the State's population on its employment problems, studies on the costs of transportation to rural communities, and on the effect of the State's industrial expansion program on employment.

Volume VI, beginning with a summary of the population growth-history of the State, considered also such problems as those of recreational income, industrial opportunities arising from the European war, recreational needs of small communities, the comparative tax rates of our civil subdivisions and the employment problems of the young and aged in our State.

Volume VII has dealt with the machine tool industry, the bituminous coal industry, with the uses of the air photographs now available in the Planning Board's files, and with the State's program for cooperative roadside improvement.

In addition to the publications here listed and indexed in the final pages of this issue there are numerous publications of other agencies to which the Planning Board or members of its staff have made substantial contributions. These include: "Space Occupied by the Government Departments in Harrisburg," January, 1939; "Planning for the Future of the Harrisburg Area," 1940, to which the staff of the Planning Board contributed a large number of illustrations; the "Report of the Capitol Grounds Extension Committee," 1940, for which the staff prepared both maps and photographs; and "The Tentative Final Report of the Park, Parkway and Recreational-Area Study of Pennsylvania," March, 1938, containing a survey of all available and needed recreation areas in the Commonwealth, a seventy-page report prepared and published by the Planning Board in cooperation with the National Park Service of the U. S. Department of the Interior. In addition to a detailed review of all existing recreational land facilities this study includes a survey of population and economic data and a summary of the estimated recreational land needs of each of the State's metropolitan districts.

RESEARCH REPORTS

A large number of reports of the Planning Board have been prepared for special distribution and have not been printed. These include:

Preliminary Data on 91 Potential Recreational Areas—January 17, 1935.

Preliminary Reports (to National Park Service) on 13 Recommended Recreational Areas — February to May, 1935.

Proposed All-Weather Highway (including a History of South Pennsylvania Railroad)—March, 1935.

Report on Emergency Landing Fields Needed in the State of Pennsylvania—April 2, 1935.

Report on Pennsylvania Subsistence Homesteads—April 20, 1935.

Report on Conditions in Clearfield County—April 25, 1935.

Inventory of Works Projects (State-wide)—April, 1935.

Federal Expenditures in Pennsylvania—May 1, 1935.

Population Estimates for 1934 by Civil Subdivisions.

Report on Conditions in Bradford County—June 10, 1935.

A Plan for the Solution of Tax Delinquency by the Introduction of a System of Management to the Use and Development of Agriculture Land —June 11, 1935.

Report on Conditions in Tioga County—June 25, 1935.

Report on Conditions in Bedford County—June 25, 1935.

Report on Statistics of Coal Mining in Pennsylvania—July 2, 1935.

Report on Suggested Research Projects—July, 1935.

Estimated School Enrollment in Pennsylvania—August, 1935.

Analysis of Medical Personnel, Facilities and Costs in Pennsylvania—September, 1935.

State Departments' Ten-Year Estimate of Public Works—October, 1935.

Regulation of Pennsylvania Intra-State Motor Carriers—October 10, 1935.

Relationship Between School Costs and Revenues in Clearfield County—October, 1935.

Analysis of Forest County School System—October, 1935.

Teacher Supply and Demand in Pennsylvania—November, 1935.

Report on Survey of Adult Educational and Recreational Activities and Facilities—November, 1935.

Index of U. S. G. S. Primary Traverse Notes—December, 1935.

Index of U. S. G. S. Triangulation Stations—December, 1935.

Proposed Flood Control Program for Pennsylvania—March 23, 1936.

Population Estimates for 1935 by Civil Subdivisions—April, 1936.

Land Use in Pennsylvania—1939.

The Economic Effects of the European War—1940.

Increased Markets for Silk Hosiery for Pennsylvania in Latin America—1940.

Philadelphia Port Development—1940.

Possibilities of a Flax Growing and Linen Industry in Pennsylvania—1940.

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6. Progress Report (1936)
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15. Planning and Zoning; Powers and Procedures (Vol. 2)
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17. Pennsylvania, An Inventory
18. Pennsylvania Planning (Volumes in Roman Numerals)
19. Parks, Parkways and Recreational Areas

RR Research Reports
M, C, and G Maps, Charts and Graphs
SS Statistical Series Maintained by Staff

PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December 1934.
2—A Standard System of Plane Coordinates for Pennsylsylvania, January, 1936.
3—A Standard System of Plane Coordinates for Pennsylsylvania, Non-Technical Explanation, December, 1936.
4—Progress Report, Pennsylvania State Planning Board, December, 1936.
5—Research and Planning Program, December, 1936.
6—An Analysis of the Status of Mapping in Pennsylvania, December, 1936.
7—Municipal Borrowing Power, Debts and Unemployment, February, 1937.
8—Problem Areas in Pennsylvania, March, 1937.
9—Cameron County, an Analysis of Problems, 1937.
10—Drainage Basin Study, 1937.
11—Planning and Zoning, Powers and Procedures in Pennsylvania, 1938, Volume I.*
12—Planning and Zoning, Powers and Procedures in Pennsylvania, 1938, Volume II.*
13—The Pennsylvania Zoning Primer, 1940, Volume III.*

In addition to these publications the following issues of **Pennsylvania Planning** are of special pertinence:

Planning Directory, May-June, 1939.*
County Data, July, 1939.*
Annual Report Number, January-February, 1940.*
Local Tax Rates, May-June, 1940.*
Machine Tool Industry, August, 1940.*
Bituminous Coal Study, September, 1940.*
Air Photography, November, 1940.*
Roadside Improvement, December, 1940.*
Defense Problems, January-March, 1940.*
Post-Defense Problems, April-June, 1940.*

These publications may be seen in representative public libraries. A limited number of those which are marked with an asterisk (*) are available for distribution.

Many other reports, maps and graphic presentations have been made. These are not available for distribution, but can be seen at the Planning Board offices.

PENNSYLVANIA PLANNING

DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

SEPTEMBER · OCTOBER · 1941 ·

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COMMONWEALTH OF PENNSYLVANIA

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
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The Needs of the People

¶ Today we are bending every effort of the State and Nation to the production of materials for the armed defense of our Republic.

¶ In this task Pennsylvania has a vital part to play because of her unequalled resources for the output of those materials which alone can ensure the success of our national effort.

¶ The specialized needs of this hour supersede, and for the moment thrust into second place, many problems of employment, of distribution, and of consumer demand, whose solution seemed vital to our welfare, even so short a time as one year ago.

¶ The needs of the people change but one thing does not change. It was the same yesterday as today, and the same today as it will be tomorrow.

¶ And that is the need for increased productivity, of productivity by all our people under all conditions of national demand and want.

¶ It is the need that all of us in some way shall create values that can be shared with other men.

¶ Only through the production of such exchangeable values can the spectre of unemployment and want ever be laid, and the changing needs of the people always be met.

¶ In this fact lies the evaded issue of the crisis which confronts our modern industrial society.

¶ In the articles in this number of PENNSYLVANIA PLANNING—the third on the Defense and Post-Defense problems confronting our Commonwealth—three methods of approach to a solution of this vital problem are propounded—that of the regional pooling of productive resources, that of community self appraisal, to evoke all the hidden possibilities of every area of our State, and that of scientific research to develop new possibilities and new materials for the satisfaction of the rapidly changing needs of modern life.

Industrial Expansion for National Defense

The President of the United States, in his May 27th proclamation of an unlimited national emergency, called for an unprecedented expansion of American production.

This call indicates industrial and business changes for every enterprise and every community in the country. Because of its size, diversified economic background and strategic national position, Pennsylvania is involved in this situation as are few American states. The scope of the national defense program, and the adjustments of the people to it are not predictable in exact terms, but certain trends are clear.

The immediate demand for military equipment and supplies will introduce into the American economy new products, many of which will undoubtedly remain and be adapted to peace-time purposes in the post-war period. It is a reasonable assumption, also, that the production of military goods for a permanently enlarged defense force will require for a long time an increased proportion of America's productive energy. It is therefore a fairly safe prediction that a materially changed pattern of American industrial production will grow out of the national defense program and the current dislocation of international trade.

The great variety of products that are in demand in this adjustment are suggested by the following types of equipment or the supplies for operation: airplanes, airports, ships, shipyards and bases, motor transport, tanks, guns and ammunition, communications, and by the following requirements for maintenance of military personnel: food and means for its preparation, clothing, housing, medical supplies, materials for education and training.

The essential needs of the civilian population are no less pressing. The only offset against a severe curtailment of civilian supply is in an increased efficiency in the production and distribution of the goods that maintain that supply. Pennsylvania is in an advantageous position to meet this demand. To do so, we have only to develop our enormous latent possibilities. For many years this State has been heavily deficient in the manufacture of many types of consumer goods for which it has both the undeveloped resources and mar-

VALUE OF PRIMARY DEFENSE ORDERS PLACED WITH PENNSYLVANIA MANUFACTURERS

To July 1, 1941 (Approximately one-year period)*

County	Value of Defense Orders (Excluding Construction)	Annual Value of Manufactured Products 1937-'38-'39 Average	% of Defense Orders to Annual Production
Adams	$390,925	$13,543,000	2.88
Allegheny	73,523,680	1,249,647,000	5.88
Armstrong	189,895	30,982,000	.61
Beaver	2,374,512	232,632,000	1.02
Bedford	—	1,958,000	—
Berks	6,054,237	151,600,000	3.99
Blair	11,000	63,170,000	.02
Bradford	869,727	16,337,000	5.32
Bucks	714,894	50,343,000	1.42
Butler	5,500,899	41,594,000	13.23
Cambria	144,011	97,237,000	.15
Cameron	3,025	4,654,000	.06
Carbon	—	30,778,000	—
Centre	937,752	10,151,000	9.24
Chester	4,588,299	55,612,000	8.25
Clarion	13,390	7,273,000	.18
Clearfield	46,474	19,442,000	.24
Clinton	—	20,893,000	—
Columbia	59,944,392	24,254,000	247.15
Crawford	2,176,782	37,845,000	5.75
Cumberland	76,048	24,853,000	.31
Dauphin	6,740,079	106,164,000	6.35
Delaware	253,800,332	249,216,000	101.84
Elk	126,717	22,646,000	.56
Erie	5,055,542	131,481,000	3.85
Fayette	10,315	53,902,000	.02
Forest	—	2,969,000	—
Franklin	867,692	24,628,000	3.52
Fulton	—	418,000	—
Greene	—	9,143,000	—
Huntingdon	—	7,750,000	—
Indiana	—	15,437,000	—
Jefferson	53,541	11,183,000	.48
Juniata	—	1,350,000	—
Lackawanna	1,217,665	82,774,000	1.47
Lancaster	2,502,399	125,341,000	2.00
Lawrence	2,321,739	61,623,000	3.77
Lebanon	101,913	43,964,000	.23
Lehigh	3,459,726	99,606,000	3.47
Luzerne	4,111,533	165,798,000	2.48
Lycoming	13,706,614	45,428,000	30.17
McKean	61,608	25,901,000	.24
Mercer	9,022,831	115,134,000	7.84
Miffin	61,939	20,762,000	.30
Monroe	1,048	6,467,000	.02
Montgomery	31,933,252	175,415,000	18.20
Montour	1,567,360	2,219,000	70.63
Northampton	25,497,795	123,400,000	20.66
Northumberland	1,558,463	41,920,000	3.72
Perry	—	1,364,000	—
Philadelphia	685,720,287	1,380,335,000	49.68
Pike	—	293,000	—
Potter	—	3,989,000	—
Schuylkill	278,860	69,149,000	.40
Snyder	16,489	3,077,000	.54
Somerset	—	12,120,000	—
Sullivan	—	698,000	—
Susquehanna	—	2,476,000	—
Tioga	—	17,949,000	—
Union	25,960	3,760,000	.69
Venango	375,956	40,139,000	.94
Warren	1,224,963	23,274,000	5.26
Washington	207,642	148,141,000	.14
Wayne	—	2,509,000	—
Westmoreland	8,599,210	159,388,000	5.40
Wyoming	—	3,492,000	—
York	13,975,623	118,143,000	11.83
TOTAL	$1,231,765,035	$5,940,626,000	20.73

* See note on page 6.

kets. Now is the time for us to prepare to supply those deficiencies.

* * *

A large scale production of equipment and supplies for the army, navy and airforce, not provided normally by American industry, will require major technical and financial reorganization in our industry. The established plants in this State are being called upon to adapt their operations to the new type of products as fully as may be practicable. A large expansion of productive capacity by the construction of new plants is also indicated. Time is the critical factor in such a development. An immediate expansion of such production will necessitate a substantial diversion of labor, materials and plant from civilian supply until substitutes can be provided.

Every American community will feel the effect of this industrial reorganization. No two will be affected alike, nor in the same degree. Each must meet the situation in terms of its own particular resources. This is especially true in Pennsylvania. In its possession of essential basic economic resources — fuel and lubricants, metal, mineral and agriculture products — this State is more nearly self-sufficient than any other American State. These resources, however, are not distributed uniformly and there are consequently a number of major economic areas in Pennsylvania—each essentially different from the others.

* * *

The initial efforts of American industry during the past year in production for the national defense program were directed largely toward the fullest possible use of existing facilities. Out of these efforts there grew in Pennsylvania a new practice—regional pooling of industrial resources. This device, which to date has been applied in a very limited way, can be utilized for a very much enlarged service. It can be the instrument not only for expanded production of military goods but also as an aid in conserving and stimulating the production of essential civilian goods.

The objective of regional pooling of productive resources is a maximum use of available economic resources with a minimum of worker migration. A conservation of local values, human and material, is a vital conservation of time and energy and money, so essential in the present emergency. The use of regional pooling up to this time has been centered largely in the need for increased production of ships, airplanes, tanks and guns. It has proven its value in this initial effort. The unlimited emergency now declared by

VALUE OF PRIMARY DEFENSE ORDERS PLACED WITH PENNSYLVANIA MANUFACTURERS

To July 1, 1941 (Approximately one-year period)

(By Classification or Type)

Chemicals and Allied Products		$4,222,742
Clay, Glass and Stone Products		2,994,736
Food and Kindred Products		630,771
Leather and Rubber Goods		1,462,835
Lumber and Its Remanufacture		2,046,384
Miscellaneous Metal and Metal Products:		
Semi-Finished	$25,629,623	
Finished	22,255,397	47,885,020
Nonferrous Metals and Products		734,975
Electrical Supplies and Appliances		8,623,814
Transportation Equipment		31,078,312
Tanks and Parts		93,165,090
Guns, Armor Plate, etc.		75,042,727
Machine Tools, Gages and Other Machinery		18,592,427
Mine and Quarry Products		629,654
Paper and Printing		848,193
Textiles and Textile Products:		
Equipment	$8,938,752	
Wearing Apparel	49,123,799	
Use Unspecified	1,130,406	59,192,957
Shells and Ammunition		69,053,858
Ships and Boats		795,102,700
Airplanes and Parts		13,785,097
Miscellaneous Products, N.E.C.		6,672,743
Total		$1,231,765,035
Building Construction		88,727,054
GRAND TOTAL		$1,320,492,089

NOTE: Does not include orders amounting to $75,418,977 placed with Pennsylvania contractors for work to be done in other states or orders amounting to $14,432,251 placed with out-of-State contractors doing work in Pennsylvania. Also excluded are allocations for non-manufacturing purposes such as Defense Training Programs, Defense Housing Projects, W.P.A. Defense Projects, etc.

Source: Compiled by
DEPARTMENT OF COMMERCE, STATE PLANNING BOARD
from reports of
OFFICE OF GOVERNMENT REPORTS and
NATIONAL DEFENSE ADVISORY COMMISSION

the President provides the opportunity for a comprehensive extension of this venture in practical cooperation.

The essential first step for every community to take, in behalf of both the national and the local interest, is a factual search for all that it has to offer in productive resources. An adequate appraisal of all the productive possibilities of any community or group of communities in the light of these rapidly changing demands will involve an expansion of the local pooling organization to include representation of all types of industry in the community — manufacturing, mining, agriculture — of merchandising, banking, housing, transportation, electric, gas and water services, professional engineering organizations and educational agencies. A central fact finding agency set up within the community pooling organization to assemble and analyze all information with respect to unused natural resources, productive equipment and man power is the key to successful pooling. The Pennsylvania Department of Commerce will cooperate with individual communities and regional groups in the organization of the simplest possible procedures for the assembly of data and the study of ways and means of adapting unused resources to the changing needs of our state and nation.

The combination of military and civilian needs imposes a herculean task on the American people and a challenge not only to their skill, technical ingenuity and organizing genius, but to their capacity for effective cooperation. In the adjustments barely indicated here, it is clear that the fundamental imperative today, and for many years to come, is increased production with a minimum waste of man power.

The two tables presented on pages 4 and 6 are a revision of those pubished in the January-March issue of PENNSYLVANIA PLANNING.

These tables represent the only available and complete record of the direct contracts allotted to Pennsylvania in the first year of our national defense effort.

Since July 1 the Navy has withheld publication of its defense contracts. No later complete data for a full year period is therefore likely to be available until the close of the present world war.

HARRISBURG AREA REGIONAL PLANNING COMMISSION

The outstanding event of the year in local planning in Pennsylvania is the formation and staffing of the Harrisburg Area Regional Planning Commission. Authority for the formation of official Regional Planning Commissions was included in the County Planning Enabling Act which was sponsored by the State Planning Board and passed by the General Assembly in the Session of 1937. The Harrisburg Metropolitan Area is the first region in Pennsylvania to take advantage of this authorization.

The formation of this Regional Planning Commission brings together the planning interests of Dauphin and Cumberland Counties, the City of Harrisburg, the Boroughs of Paxtang, Penbrook, Camp Hill, Lemoyne, New Cumberland, West Fairview and Wormleysburg, and Swatara and Hampden Townships. Each of these civil divisions has made appropriations for the maintenance of the Regional Planning Commission and has appointed official representatives to serve on the Commission. It is expected that several other Boroughs and Townships will ultimately be represented on the Commission.

At its first election of officers, Mr. Frank A. Robbins, Jr., was elected as President, Mr. Vance C. McCormick as Vice-President and Mr. George W. Reily as Treasurer. Mr. Floyd A. Carlson of Kenosha, Wisconsin, has been employed as Executive Director and Secretary of the Commission. Mr. Carlson has had long and successful experience as Director of the Department of Parks and Planning of the City of Kenosha.

REPRINTS AVAILABLE

Reprints of the article on Community Self-Appraisal which appears on pages 9 to 16 of this issue are available upon request for use by municipalities who are interested in making community inventories.

AUGUST 1941 ISSUE OF PENNSYLVANIA PLANNING

The August 1941 issue of PENNSYLVANIA PLANNING is an index of publications of the Pennsylvania State Planning Board. It was not given general distribution since it is probably of interest only to those who have retained a full set of past issues of PENNSYLVANIA PLANNING and other publications of the State Planning Board. It is available on request.

Community Self Appraisal

I

At a time like this, when the whole effort of the greatest industrial nation in the world is being turned from the production of peace time materials to the manufacture of instruments of war, we know that every community in our State is deeply affected in its present livelihood and well-being, and in its future prosperity, by these changes. We are also aware of the fact that however much our outlook has been changed in the past year by the national defense program we must also look forward to the fact that following that program must come a time of profound readjustment which may bring with it great opportunities and also profound dangers to the people of our country, our State and our local communities.

In a lecture delivered at Yale University some 30 years ago that wise and great physician, Dr. Osler of Johns Hopkins, said that at least once in every man's life he should climb up onto a hilltop and indulge in a period of self-examination. What is true for a man and the needs of his life is likewise true for a community and the needs of its people. At no time in our generation, perhaps at no time in our history, has the necessity for such a self-appraisal been more evident than it is today. We stand at what may well be a turning point in the development of our industrial civilization. Great demands are being made upon our people, calls for sacrifices of many of our peacetime pleasures. Employment is being afforded to millions, but employment of a nature that is obviously temporary. From some of our communities the young men and women are being drained to supply the industries of our crowded towns. Into other of our communities large numbers of workers are gathering for employment in newly created industries essential for national defense.

In facing these conditions there is no community, however small or great, in the whole State of Pennsylvania that does not need to take immediate account of its resources. Such a community effort at self-examination, and the direction of the results of such an examination into the practical terms of a program of action cannot be carried out without the united support of every citizen and every public agency concerned in the local welfare.

The primary questions which must be asked are these: (1) what do you need for a prosperous community life? (2) what can you do to supply those needs? (3) what can you do to supply the needs of the people of your Commonwealth and the people of your country? In short, what can you do to add to the national wealth and wellbeing, for only by what you supply to satisfy the needs of others can your town or community hope to receive in exchange the things you want for yourselves.

The first step necessary in order to organize a community's efforts is the formation of a committee, or an agency that will represent everybody. It should include, businessmen, manufacturers, educators, clergymen, realtors, farmers, and members of all community or service groups and, of course, representatives of the local Planning Commission, if one exists. It should be organized first to acquire all the necessary information as to the town's capacities and needs; second, to appraise that information; and third, to carry out a program of action, aimed at developing within the community the full use of all its resources and all its advantages in labor, raw materials and location.

The things which must be known before such an appraisal can be made and which must be known exactly before the information can become of any practical value are indicated in the following questions which might serve as a basis for a questionnaire to be answered with the help of your schools, your public utilities, your real estate boards and your city, borough, or township engineers. Certain of the information asked for in these questions is available from State or Federal sources and much of it has been accumulated and analyzed by the State Planning Board of the Department of Commerce and is available from that agency upon request. Other items of information, however, can be uncovered only by community effort, and it is chiefly to that type of question that the following outline is directed.

1. What are your surplusses and deficiencies in labor?
   Needs or surplus, skilled
   Needs or surplus, college or technically trained
   Needs or surplus, unskilled
   (Each by age and sex)

2. How much of your labor is now employed elsewhere? How much of this labor would prefer to be employed near home?

3. What is your present employment (by age and sex)? How much in defense industries?

4. What are your surplusses or lacks in housing and recreational facilities?
    a. Present housing and its condition
    b. Housing under construction
    c. Housing needed
    d. Recreational facilities in community and county.
5. What are your educational facilities?
    a. Maximum capacity of schools, primary and secondary.
    b. Present enrollment
    c. Facilities for vocational training, and number of present enrollees.
6. Churches and Libraries.
7. Civic and service bodies, membership and public activities.
8. Sex, age, birthrate, death rate, and racial composition of population
    % native born
    % and number of rural farm, rural non-farm, and urban
9. What are your available industrial sites and buildings?
    Type, floor capacity and facilities (Photographs).
10. What are your available local raw materials — including production and resources of mines, farms forests, in detail adequate for practical use.
11. What is your present industrial production, including hand work, and manufactured products?
12. What are your public financial resources?
    Capitalization, deposit and surplus of banks and trust companies
13. What is your tax rate and what are your community debts, including both bonded and short term obligations?
14. What are your power resources and rates—industrial and domestic?
    Gas
    Electricity
15. What is the capacity and present load of your water supply? The chemical analysis of your water? The possible future supply?
16. What is your sewage or waste disposal capacity? Possible future capacity?
17. What are your transportation facilities?
    a. Railroads — connections, terminals, time of delivery of freight from industrial centers and Atlantic seaboard
    b. Highways—main route
    c. What traffic or parking problems affect the safety of your streets or the

conduct of business or industry?
    d. Airports — size of runways and accessibility

18. What are your local markets?
    a. Retail stores, employment by types
    b. Wholesale stores, employment by types
    c. Retail trade per capita
    d. Vacant business properties
19. What are your regional markets?
    a. Population of area within 10, 25 and 50 miles
20. What is the purchasing power and living standard of your area?
    Telephones, Radios, Automobiles
    Farm Tractors in Country
    Farm Cash income
    Farm Live Stock
    Salaries and wages in trade and industry
21. What factories are now affected by defense priorities—product and employment affected?
22. Factories engaged in defense work? Their product, orders and employment?
23. Factories having idle tool capacity not now employed in defense work?

When these questions have been answered to the best of your ability it will be possible to construct a community balance sheet upon which the surplusses and deficits of your town can be listed honestly and objectively. Such a balancing of deficits and surplusses is vital to the success of any undertaking for improving the industrial condition of your community. It is worthless to attempt to develop or attract industries you do not want and cannot handle. Deficiencies must be faced, and may help as much as your resources in defining your local problem and pointing out to you the direction which your industrial efforts must take. Such a balance sheet should explain why you do not now have the kind of industrial development you want. It should also explain the kind of industrial development you may hope to have if you direct your efforts definitely toward such a goal. It is just as unlikely for a community to develop an industry in its midst without knowing what it is best fitted for, as it is for a man to gain employment in hard times without having some special skill to offer in the labor market. The sign "industries of any kind wanted" never attracted desirable industry to a town any more than an advertisement "work of any kind desired" ever found a good job for a man.

If, upon the community balance sheet, under your shortages and deficits, you must write down *poor water supply, inadequate waste disposal,* as you should, if those are the facts, these items would at once eliminate from the possible industries of your town all those in which a large water supply or an ample waste-water run-off is essential. If among your community items you must list as a deficit *high debt and taxes,* or *crowded schools* you must again face the fact that an industry attracting a large amount of unskilled labor into your community might provide you with an unbearable burden. So the list of deficits and the parallel list of surplusses when honestly made on the basis of the inventory of your community resources should lead you finally to answers to such questions as these:

(1) What products now imported into your community or what substitutes for products denied by defense priorities could be manufactured there?

(2) What materials purchased by your manufacturers could be supplied locally?

(3) What, if any, of your local raw materials are processed or manufactured elsewhere and brought back for sale in finished form?

(4) What changes in farm or other products, could adapt them to current needs?

(5) What products now forming a surplus, difficult of disposal, could be replaced by other products more in demand?

(6) To what types of product could your particular surplusses of labor be applied?

(7) Why have certain industries succeeded in your community?

(8) Why have certain industries failed in your community?

(9) Is your community physically attractive enough to interest outsiders? If not, it is possible that its improvement and development must proceed from within.

(10) What types of industry do your local conditions make possible?

(11) What types do your local conditions exclude as (a) undesirable, (b) impracticable?

When you have advanced so far in your progress toward the diagnosis of your possibilities and your needs, the State Department of Commerce will be very glad to lend you its services through its trained industrial engineers and the research services of the State Planning Board in aiding in the diagnosis of your possibilities.

But all this is the mere preliminary to the important effort which must finally be made, and that is the selling of your possibilities, first of all to your own people, and second to the industries of the State and the nation. We believe that the first aim, the development within the community of industries which utilize to the full your local possibilities, is perhaps the most important direction which the efforts of every community can take. While it is easier to imagine an outside capitalist or an established industry erecting an enormous plant on the outskirts of your town, and providing large employment to your people, and while such an event may thinkably occur in many communities within the next few years, it is also true that the most important and most substantial real progress made in our nation has been as a result of enterprises which began small and ended great. It is easy to forget the fact that great corporations had small beginnings, and that in some modest local enterprise which provides no sudden strain on the facilities of your schools or houses may often be found the germ of a great industry of the future.

Within the past few months attention has been called to the success of a midwestern industry begun by a housewife who made in her spare time a few candlewick coverlets for local sale. From that modest beginning has grown a large and prosperous textile industry employing hundreds of workers. The manufacture of a glass container with a screw top in which housewives could pack their home-made preserves without danger of leakage would seem a relatively simple and modest enterprise and yet from the profits of the Mason Jar was accumulated sufficient capital to buy control of the Van Schwerigen system of railways, including the Chesapeake and Ohio. Henry Ford's enormous interests began in a small machine shop, and the airplane owes its beginning to the experiments of two country boys in the back room of a bicycle store. The full use of a community's own resources to supply, first of all, its own needs, and going on from there, the needs of its neighbors in a widening circle has been the process by which America's industry has risen to greatness.

If it appears that the industrial resources of your town or community offer favorable opportunity for the location of factories or industries financed by outside capital, or for the expansion of existing industries through a branch plant, the help of the Department of Commerce is also available to attempt to uncover for you the prospects for such an expansion. This is also true if among the industries of your town are some which could now participate through sub-contracts or direct contracts in the national defense effort.

Your Department of Commerce is organized to aid all of the communities of this State in their efforts at self-improvement. It cannot do for you that part of the work of developing your possibilities which is properly the responsibility of the community itself, but it can and will assist you in analyzing the facts of your situation when you have uncovered those facts, and in applying them to the immediate problems which confront you. We cannot too much stress the point that now, before the full stress of this time of national emergency has been felt by us all, is the time of opportunity for our local communities to examine with a sharp and impartial eye all their possibilities and to explore all their qualifications for adding their part to the national strength and the national wealth.

II

So far, in this brief survey, emphasis has necessarily been laid upon the primary problems of earning a living and of attracting and stimulating industry. But these are not the only problems of this hour, nor are they the only important problems.

Into many of our towns and cities have recently come large numbers of people to work in industries stimulated by the program of national defense. For such temporary or permanent additions to those communities, schools, public facilities and houses must be immediately provided. In the past, each such boom time, whether occasioned by war or by rapid industrial growth, has resulted in after effects which have often blighted the community growth and diminished its resources for many ensuing years.

Such times as these, involving far reaching changes in industrial and social background, challenge the democratic process to provide an answer on every level of national life.

A town as a place for living has certain necessities important to all its citizens. Those necessities for living have seemed often, in our American communities, to clash with the requirements of business or industry.

But that was a very shortsighted view. We know now that bad living is bad business for everybody. The means by which a living is made, and the conditions of living have to be reconciled before any community can take a proper pride in itself. Traffic, for instance, affects the efficiency of industry, affects the volume of retail business and also affects the safety of our children and the peace and quiet of our homes.

Community Self Appraisal

The appearance of any locality is one of its chief assets, both commercially and for its value as a place in which to live. To hold our children loyal to their homes, and to prevent those needless social unrests and dissatisfactions that result in the separation of families, we must fight for the attractiveness of our towns. In allowing their natural beauties to be destroyed we are giving away one of our most important assets.

To control or forbid defacements hurts no legitimate local business in any serious way. It is a necessary step to preserve the American standard of living, and to protect our pride and content from influences that might destroy both, if unchecked.

Proper schooling is an essential of the American way of living. To provide it at the least cost, and with the greatest convenience, involves placing our schools where they will be most useful today and in the forseeable future. It involves thought as to accessibility, highway dangers and highway noise and distraction.

Provision for recreation has become a necessary part of our community life. Public school facilities are, under Pennsylvania law, available for local adult recreation, and it is possible at very little local expense to have county library service. The proper placing of recreational centers depends on population prospects, and also on present and future traffic. If your community does not have approximately ten acres of recreation space for every thousand people, it is below the accepted standard in providing for the needs of its people for healthful outdoor life.

To enable such problems to be dealt with wisely and with foresight as to future needs, there exist on the statute books of our Commonwealth a series of Planning and Zoning Enabling laws. Those communities which today have, in their local government, active planning and zoning commissions may find that many of the questions submitted here, have already been answered in the course of their duties.

The cooperation of such a commission, where one has been appointed, or the appointment of such a commission, with adequate technical staff, to undertake the appraisal of the resources of a community appears to us to be a wise and forward-looking step.

For communities facing the problem of the location of defense industries and defense housing and perhaps of schools and other facilities, a zoning ordinance based on a properly considered plan of community development is a very necessary measure of self protection for the financial and social interests of the community, both now and in the post defense period which must inevitably follow.

Applied Science in National Defense and in Post-War Development*

By
L. W. BASS
Mellon Institute, Pittsburgh, Pa.

I

Science and engineering are forces of prime importance in our national welfare in times of peace. During periods of stress like the present they must be largely diverted from their usual courses, for today, as never before, national defense depends upon technological achievement. It is obligatory that the efforts of our laboratories should be concentrated to the fullest upon the problems arising from the emergency. But while our basic endeavor must be devoted to the harsh necessity forced upon us, it is but natural that we, a peace-loving nation, should still prepare, as best we may, for a return to a normal world.

Under the stimulus of preparedness certain branches of technology will doubtless forge ahead with great rapidity. The duress of shortages of strategic materials will create new applications for those that are more plentiful; for example, the development of uses for plastics to replace aluminum and other metals is already underway and will surely advance speedily. The requirements of military aviation and transport will demand new developments from the aircraft and automotive industries. From such sources will come lessons that will be made the basis for new improvements in peacetime living.

This expectation is justified from past experience, as the following examples will show. In the realm of physical technology, we owe the origin of modern mass production to an order obtained by Eli Whitney from the government in 1798 for several thousand muskets; dissatisfied with the existing methods of manufacture, he courageously proposed to produce these arms by means of standardized interchangeable parts, and his success in this venture paved the way to the assembly line of today. On the chemical side, we have but to recall the development of our synthetic organic chemical industry from an insignificant output in the early years of World War

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* An address delivered at the Pennsylvania Conference on Industrial Production for National Defense, Harrisburg, May 22, 1941.

I to a giant production of $350,000,000 per year today; then we were dependent upon imports for our synthetic medicinals and dyes, while now our chemical manufacturers are prepared to meet all our needs for these and other products.

II

To rely upon chance discoveries is not an adequate solution to the problems of post-war economy any more than it is in normal times. Within the past twenty-five years American industry has come to realize that planned, organized research is the proper path by which to seek new and improved products, novel and better processes. Today there are in operation throughout the country more than 2,200 industrial research laboratories, according to a survey recently completed by the National Research Council.* American industry employs over 70,000 research workers at an estimated annual cost of the order of $300,000,000.** That these activities are accepted by management as a sound investment is attested by the fact that such expenditures are probably double those of a decade ago.

Industrial research may be divided into two broad classes, namely, short-time practical projects and long-range fundamental investigations, although there is of course no sharp dividing line between the two types. The goal of the former is the solution of the more immediate aspects of current production and development, while the latter are devoted to searches for more radical departures in technology. In general, the former are usually conducted in the laboratories of companies and consultants; the long-range studies are carried out in institutional, governmental, and university laboratories.

It must be clearly understood that the period of time required to translate pioneering research into commercial operation is normally a matter of several years. Our search for the basic knowledge that is to serve industry in the next decade must therefore be carried out now.

The research problems of industry in connection with national defense will fall first upon the company laboratories, and the imperative nature of these demands will relegate other studies to the background. Many immediate problems are also being assigned to investigators whose normal sphere is that of basic research. No efforts must be spared to prosecute these studies to their utmost, and indeed our facilities for defense research must be greatly expanded. The difficulty lies in the limited number of competent men with the requisite technical training. The shortage of scientists and engineers is already acute, and the situation is daily becoming more straitened. During the last several months an exhaustive census and classification of technical men has been conducted by the national government to the end that their services may be most intelligently allocated to the host of scientific problems confronting us.

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* "Industrial Research Laboratories of the United States," National Research Council, Washington, D. C., 1940.

** "Research—A National Resource: Part II—Industrial Research," Report of the National Research Council to the National Resources Planning Board, U. S. Government Printing Office, Washington, D. C., 1941.

III

With defense research absorbing an increasing number of technical men from all sides, including fundamental science investigations, the possibility of carrying on adequate basic studies of long-range character becomes increasingly restricted. This situation is, of course, inevitable and justified, but it requires a concerted program backed by all concerned to correct the basic difficulty. It has been proposed that American companies should set aside 2 per cent of their gross incomes for research, with the objective of establishing a fund of $1,000,000,000 for investigations aimed at the creation of new industries, new jobs, and new products.

Since the major problem lies in obtaining technically trained manpower, it is requisite that competent investigators be made available. First, research men should be relieved of other nontechnical obligations to permit them to devote their abilities in the proper directions. Secondly, the training programs of our educational institutions should be increased and improved, to permit a greater flow of graduates into research laboratories. Finally, many faculty members are handicapped by lack of facilities and of contact with the basic problems of industry; an intelligent effort should be made to enable such men to serve in the national emergency by employing their talents to an adequate end.

IV

Today we have met primarily to consider the part that our Commonwealth can play in this emergency. We can indeed feel proud of our situation and its potentialities. The tradition of Pennsylvania in science and its applications is a rich one which bestows a benediction upon our meeting and future undertakings that may arise from it.

From early Colonial times scientific explorers and industrial pioneers have found this State a fruitful home for their efforts. The research achievements of Benjamin Franklin, who founded the American Philosophical Society in 1743, have been perpetuated in the activities of the

Franklin Institute. To Philadelphia goes also the credit of being the birth-place in 1792 of the first chemical society organized on the American continent. The technical leanings of many of our citizens have been crystallized through the medium of outstanding institutions of learning distributed throughout the State.

In organized industrial research Pennsylvania holds an enviable position. According to the census of the National Research Council mentioned previously, our borders house a total of nearly 375 research laboratories, roughly one-sixth of all such establishments in the country. In importance, also, many of our research groups are among the world's leaders.

V

Not only in the present, but also throughout the past century our industrialists and scientists have held an outstanding position. Through their work, new industries have been developed within our borders: in the manufacture of iron, steel, and coke, the sinews of modern civilization were forged; aluminum has been transformed from a laboratory curiosity into a household metal; the development of petroleum refining in Pennsylvania paved the way for a world-wide industry.

Not all our industries are spectacular in their exploitation of science. Some are handicapped by a preponderance of art rather than technology in their processing; in such cases it is not easy to outline satisfactorily a fundamental research approach. In others, the economic background of staple items produced by relatively simple means for a highly competitive market is not too fertile a field for radical industrial innovations. But, by and large, management here is aware of the advantages of research and is continually increasing the extent of such activities.

In the eastern part of our Commonwealth the anthracite industry has undertaken a broad program of research aimed at improving the utility of its product. Studies are being conducted to develop new methods of employing anthracite as a source of carbon, heat, and chemicals. Through such efforts it is hoped to improve the status of this important natural resource.

Pennsylvania has long been noted for its activity in the textile field, but it is not generally realized that within our borders are located three of the largest rayon mills in the world. This stake in synthetic fiber manufacture holds promise of our future development in one of the most rapidly growing branches of industry.

Turning to the western part of the State, one of our largest steel companies has long carried on investigations on practical plant problems in various laboratories. A decade ago these activities were supplemented and enriched by the establishment of a central research group for the prosecution of long-range fundamental problems. A similar trend is observed in other companies in this industry.

Commercial aluminum has already been pointed out as a creation of research. Sustained and imaginative development of its advantages has firmly entrenched it in our daily lives and technology. Indeed, diversion of the metal to military uses will entail an effort of great magnitude to find adequate substitutes during the emergency.

The manufacture of refractories was a natural growth from the pattern of heavy industries established in western Pennsylvania. Here, too, a research program of industry-wide scope has been in progress for many years to improve the service of these materials under the severe conditions of usage to which they are subjected.

Time does not permit a detailed review of our industries and the research which they maintain to promote their technical and economic advancement. These few examples will suffice to show, however, that management over a broad front has benefited from and continues to rely upon the scientist to a high degree.

VI

Pennsylvania industry knows how to employ research and supports it generously. Our rich scientific resources can be counted on to establish an enviable record of service to national defense. It is our duty, however, to encourage in every way possible the establishment of those broad fundamental projects which will aid in post-war progress.

At the close of World War I American industry had, comparatively speaking, a small commitment to research. In the short depression that followed, there was some curtailment in the employment of technical men, but those companies that prosecuted research with undiminished vigor reaped rich rewards. Expansion of scientific work continued until 1930-31, at which time a major decrease took place. Again, those managements that had the courage and foresight to continue their investigational programs vigorously were outstandingly successful in weathering adverse conditions. Later business recessions have witnessed an increasing tendency of industry to maintain research on a high scale. It is to be hoped that the advent of another post-war depression will not find management reluctant to employ the surest means of economic recovery.

VII

Now, in conclusion, what can we do to aid in applying even more effectively the forces of science and engineering to insure the continued industrial productivity and future stability of Pennsylvania industries, many of which are keystones in our national economy. To cite a few rather obvious examples, we can beneficially, especially to the smaller manufacturers, keep before the industrialists of the Commonwealth the fact that scientific research must not be curtailed under the pressure of present-day production. Too much encouragement cannot be extended to sustaining long-range as well as short-time investigations, to make certain, just as far as we can, that industry is preparing, through the strength that comes from research, for the economic unsettlement that that will unquestionably ensue after the conclusion of the World War.

A coordinated attempt should be made to encourage more young men to prepare for technologic service by pursuing professional courses that will equip them for careers in research and development work in industry. Educational institutions would certainly be glad to collaborate in such an undertaking. The opportunities for technically qualified men could be given greater emphasis in the various ways at the disposal of educationalists and public relations specialists. A State survey respecting the technical personnel needs of the industries would be of advantage in such a project.

Throughout this program the advantages of cultivating technogeography in Pennsylvania should be stressed. This subject—which has to do with the location of our manufactures and the selection of plant sites with due regard to raw materials and industrial facilities—could be applied to good effect in preparation for combatting future economic problems. Some of the districts of the State are richly endowed industrially. Many more parts of the Commonwealth are in want of industrial attention and development.

We know a lot more about industrial economics than we did a decade ago. In aiding the present and immediate needs of Pennsylvania and its industries, we could advantageously conduct planning for the application of science and engineering on a greater scale, drawing upon the existing agencies and securing the cooperation of all other organizations concerned. Only through coordinated effort can full advantage be taken of the rich natural resources, the aggressive industry, and the intelligent population of our State, with applied science as a guide to the achievements possible now and in the future.

Book Reviews

Under the sponsorship of the National Park Service and with the cooperation of the State Planning Board of the Pennsylvania Department of Commerce, and of the Pennsylvania Department of Forests and Waters, there has just been issued a descriptive list with accompanying map covering the "Non-Urban Parks and State Forests—in the vicinity of Indiantown Gap, Marsh Run Depot, Carlisle Barracks and Middletown Air Depot." This information was published to provide the officers and men of the armed forces of the United States with data as to the recreational areas and facilities available to them in southeastern Pennsylvania.

"Planning for America." By George B. Galloway and Associates. Published by Henry Holt and Company, New York City. 713 pp.

This volume represents a cooperative study of the progress of economic and social planning in the United States. Each chapter is the work of a specialist on one particular phase of planning, and the whole work is under the editorial direction of George B. Galloway. A large variety of planning problems and methods are dealt with in this valuable contribution to the literature in this field. Particularly important to local and state planning boards is the chapter by George B. Galloway on the Psychological Obstacles to Planning, a subject which has been much neglected. Part II of the seven into which this volume is divided, is devoted to Resources Planning and considers the special problems of land planning, of the use of water resources, of the planning for the wise use of energy resources and of technology in planning. Economic Planning, to which the third part of the book is devoted, deals with problems of savings, problems of finance, problems of industry, of agricultural adjustment, of employment, income, transportation and public works. Two outstanding chapters in this section are those on Income Distribution and Consumption by Mordecai Ezekiel, U. S. Department of Agriculture, and that on International Economic Relations by Ernest Minor Patterson, University of Pennsylvania. The fourth part on Social Planning deals with problems of population policy, nutrition, public health, education, recreation and social security. Among the several excellent chapters in this section that on Recreational Planning by Eduard C. Lindeman, Professor of Philosophy, New York School of Social Work, and that on Planning for the Improvement of Nutrition in the United States are outstanding. Part V on Area Planning deals with city and county planning, state planning, regional planning and with the activities of the National Resources Planning Board. The sixth part, devoted to Defense Planning, includes a chapter on War Planning by Harold J. Tobin, Professor of Government, Dartmouth College and one on Government and Industrial Mobilization by Caroline F. Ware, Assistant to the Consumer Commissioner, National Defense Advisory Commission. The work concludes with a seventh part in which George B. Galloway deals with the planning and management outlook of the future in a discussion of Tools of Financial and Industrial Management. The book closes with an essay in social prophecy entitled "Next Steps Forward."

"Time on Their Hands—A Report on Leisure, Recreation, and Young People." By C. Gilbert Wrenn and D. L. Harley. American Council on Education, Washington, D. C., 1941. 266 pp. $2.00.

This study of the problems of youth in the machine age stresses the vital need for society to provide to young men and women of our country both guidance and facilities for the healthy use of their leisure time. It portrays the unfortunate consequences of the lack of such provision in many of our rural districts and in our large cities. It stresses the need for guidance for youth in the midst of so many commercial agencies that find it profitable to mislead them. It discusses the place of recreation as a cultural influence in a time of increasing urbanization. It describes the more outstanding publicly supported community agencies and those privately supported which have been most effective in providing aid in the healthy use of leisure for rural and urban youth. The last section of the volume deals with the community, state and Federal responsibilities and functions in facing and meeting the needs of our young people for sensible direction in the use of their leisure time.

"Subdivision Regulations—An Analysis of Land Subdivision Control Practices." By Harold W. Lautner, Department of Regional Planning, Graduate School of Design, Harvard University. Published by the Public Administration Service, 1941. 346 pp.

This is a book of great value to the planning technician who must deal with the complex problems of subdivision regulation and control. It provides specific information, not conveniently available in any other publication, as to the accepted standards for street width, curvatures, grades, lot sizes, and open spaces prevailing in all parts of the United States and includes several valuable chapters on plats, grading plans and profiles in the layout of subdivisions. This is a technical work very badly needed by the practicing civic planner, but is of no general interest to the layman in the field.

"Nazi Europe and World Trade." By Cleona Lewis. Published by the Brookings Institution, Washington, D. C. 200 pp. $2.00.

This timely work provides a summary of much of the presently available knowledge in regard to Germany's economic position, her shortages and surplusses, the means by which her trade deficits were met in the war period and the methods by which she effected a balance of trade. In the final section "Nazi Europe's Place in World Trade" are summarized some of the outstanding features of the peculiar place in world commerce occupied by the countries now under German control. Pennsylvanians concerned in the effect of the present war changes upon the economic position of their own Commonwealth should consult the March 1940 issue of **Pennsylvania Planning** in which the problems arising from the world war and the blockade of the German ports are discussed from the point of view of the economic needs and capacities of our Commonwealth.

PLANNING AND ZONING ACTIVITIES

A meeting in Philadelphia on July 9, called by W. J. Finley, Regional Director of the P. W. A., was attended by representatives of State and Federal agencies who discussed proposed public work projects made necessary by population dislocations resulting from the defense program.

A joint meeting of the Pennsylvania Forestry Association, the Northeast Town Forest Conference, and the Pennsylvania Community Forest Council was held at the Nittany Lion Inn, State College, on Monday and Tuesday, October 13 and 14.

Two subjects were considered, the Federal Regulation of Private Forests, and the Establishment of Township and County Forests. Among the speakers heard at the meetings were: Harris A. Reynolds, Executive Executive Secretary of the Massachusetts Forest and Park Association; E. O. Ehrhart, Forester of Johnsonburg; and F. A. Pitkin, Executive Director of the State Planning Board. A number of County Commissioners were present at these meetings and it is hoped that action leading to the establishment of county forests will shortly be taken.

The meeting of the People's Housing Council of Beaver County on the 25th and 26th of July was devoted to a consideration of the effect of the defense program on the housing and public works needs of Beaver County. The meetings were largely devoted to a discussion of methods for dealing with the need for housing and other public facilities caused by the increased working population of Beaver County. Mr. Roy Helton, Research Supervisor of the State Planning Board, recommended that steps be taken to form a County planning and zoning body as the best available means to control and direct the developments that must be undertaken in the county, and a resolution to take steps toward forming such a planning and zoning body were adopted by the Housing Council on their meeting of July 26.

On July 29th a conference was held in the office of Mr. F. A. Pitkin, Executive Director of the State Planning Board, with representatives of the Junior Chamber of Commerce of Hanover, Pennsylvania, and with representatives of the State Office of the Junior Chambers to discuss the part which can be played in post-defense planning by their organizations.

On July 30th a meeting was held by the State Committee of the Cooperative Roadside Improvement Program in the office of Mark S. James, Secretary of the Pennsylvania Department of Commerce and Chairman of the State Planning Board, to report progress made in the formation of local committees to assist in the State-wide program. One such committee reporting was that of Jennerstown at which place a meeting had been held on July 8 with representatives of the State Committee, of the State Planning Board and of the Outdoor Advertising Association.

A meeting of the Delaware Valley Protective Association was held at Point Pleasant in Bucks County on August 29.

On the 26th and 27th of September the Pennsylvania Parks Association held a meeting at Wilkes-Barre and at Ricketts Glen, a scenic area whose purchase was authorized by the 1941 Session of the General Assembly. G. Albert Stewart, Secretary of the Department of Forests and Waters, Col. Ernest G. Smith of Wilkes-Barre and members of the General Assembly, who secured the passage of the Ricketts Glen legislation, addressed the Friday dinner meeting. On the following day the members of the Association visited and inspected this beautiful addition to Pennsylvania's publicly owned scenic areas.

PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report, 682 pages, 152 charts, December 1934.

2—A Standard System of Plane Coordinates for Pennsylsylvania, January, 1936.

3—A Standard System of Plane Coordinates for Pennsylsylvania, Non-Technical Explanation, December, 1936.

4—Progress Report, Pennsylvania State Planning Board, December, 1936.

5—Research and Planning Program, December, 1936.

6—An Analysis of the Status of Mapping in Pennsylvania, December, 1936.

7—Municipal Borrowing Power, Debts and Unemployment, February, 1937.

8—Problem Areas in Pennsylvania, March, 1937.

9—Cameron County, an Analysis of Problems, 1937.

10—Drainage Basin Study, 1937.

11—Planning and Zoning, Powers and Procedures in Pennsylvania, 1938, Volume I.*

12—Planning and Zoning, Powers and Procedures in Pennsylvania, 1938, Volume II.*

13—The Pennsylvania Zoning Primer, 1940, Volume III.*

In addition to these publications the following issues of **Pennsylvania Planning** are of special pertinence:

Planning Directory, May-June, 1939.*
County Data, July, 1939.*
Annual Report Number, January-February, 1940.*
Local Tax Rates, May-June, 1940.*
Machine Tool Industry, August, 1940.*
Bituminous Coal Study, September, 1940.*
Air Photography, November, 1940.*
Roadside Improvement, December, 1940.*
Defense Problems, January-March, 1941.*
Post-Defense Problems, April-June, 1941.*
Index of Publications, August, 1941.*

These publications may be seen in representative public libraries. A limited number of those which are marked with an asterisk (*) are available for distribution.

Many other reports, maps and graphic presentations have been made. These are not available for distribution, but can be seen at the Planning Board offices.

"George Washington said that eternal vigilance is the price of liberty.

It is also the price of permanent prosperity."

J. Russell Smith in
Men and Resources.

PENNSYLVANIA PLANNING

DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

NOVEMBER · 1941 – JANUARY · 1942 ·

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

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Pennsylvania at War

¶ Pennsylvania can do its best work for the national defense, and at the same time protect itself and its future only by now using all of its available resources. Every qualified plant in the Commonwealth must be put to work. To do so will save the construction time and the material needed to erect new plants, and it will also save the time and material needed for housing and servicing workers in new locations.

¶ To refit an old plant for defense work requires machinery and equipment. To build a new plant requires just as much machinery and equipment and also steel, building materials and labor, which we can spare only for the most urgent necessities.

¶ These things are all fairly obvious. What to do about them is now the vital point.

¶ To meet this emergency the Department of Commerce is encouraging a statewide program of community self-appraisal.

¶ By undertaking such an inventory of all its available resources of manpower, skills, machinery and plant capacity a community can be sure whether or not it is doing its utmost to provide defense materials for the Nation. Only through such a program can our production of needed peace-time goods be sustained and our community be protected against unnecessary migrations of labor.

¶ The Department has prepared a booklet on Community Self-Appraisal which is available on request and will assist any Pennsylvania Community to find use for its resources of plants, machinery or manpower after such an appraisal has been made.

Community Self-Appraisal for Increased Production

Production Must Increase

Increased production was the outstanding problem of 1941 and certainly will be that of 1942.

But Production Difficulties Are Constantly Growing

This increase of production must be attained under unusual handicaps. Priorities, shortages of imported raw materials, the specialization of our output, as well as transportation congestions, freight car allocations, and labor shortages all increase the difficulty of every type of industry including those producing direct defense materials. Our experience in 1917 and 1918 proves that these difficulties will increase progressively as our defense effort enlarges its demands. But despite every handicap the total volume of production will have to increase or grave consequences are certain to follow—consequences just as serious in their economic effects as in their military effects.

Can the Federal Government Alone Solve These Problems?

There are today in the United States more than 184,000 industrial establishments and many thousand coal and metal mines. For each one of these there are definite and all-important individual problems to be faced at such a time as this when all the industries of our Country must be keyed up to work at maximum capacity. To deal justly with each of these individual industrial problems is far beyond the capacity of any governmental agency. The productive job ahead of the Nation must be done in the most effective manner possible, and this means that it must be done with the least possible waste and the least possible damage to civilian morale. In the Commonwealth of Pennsylvania, the 1939 Census of Manufacturers reports on 13,801 industrial establishments,* the second largest number in any State in our Union. These Pennsylvania factories employ more persons than those of the seven West North Central States, the four West South Central States, and the eight Mountain States combined. In other words Pennsylvania's 13,801 industrial establishments employ more persons than do those of the nineteen States which occupy more than half of the territory of our Nation, and which extend from the Mississippi Valley west to the Sierra Nevada Mountains. This fact is merely stated as one evidence of the immensity of the task involved in conserving the individual interests of Pennsylvania's industries, if such a task were ever to be attempted by any central authority. While it is true that the Nation's productive resources must be and can be concentrated on the types of output now most vitally needed to meet the Nation's needs, that fact does not mean that the interests and the future of these nearly 14,000 Pennsylvania establishments can be protected by our Federal Government. The workers normally employed in these establishments will all find employment somewhere in our productive machinery. The State's output of manufactured goods will unquestionably increase; but what happens eventually to the 14,000 manufacturers of Pennsylvania and to the 320 types of industrial production which form their normal output must inevitably depend not on the Federal Government, but on themselves.

Can the Federal Government Alone Ensure the Prosperity of Our Retail Merchants?

Of the 1,647,160 independent retail stores in the United States, 124,475 are in Pennsylvania. Within the next six months each one of these stores will be faced with its own individual problem as to the supply of goods available to meet the normal demands of its customers. More than 250,000 employees with a payroll total of almost a quarter of a billion dollars will be affected by the success or failure of the efforts of Pennsylvania merchants to solve these problems. It is needless to say that no Government operating from any single central point could deal justly with the interests of 1,600,000 merchants, or ensure the continuance of their businesses while attempting to defend the Nation and to provide necessary materials for the Armies and Navies of all the Allies engaged in the defense of Democracy.

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* Including plants of between $1,000 and $5,000 annual capacity the number in 1940 was 17,355, according to the data of the Pennsylvania Department of Internal Affairs.

To expect of our General Government or of our State Government more than either is equipped to perform invites that very distrust of the powers of Democracy which has given rise to the frightful confusion now existing on the Continent of Europe.

The Maintenance of Small Business and of Local Industry Is Largely A Local Problem

The problems of increased production and the problems of maintaining the existence of our hundreds of thousands of small manufacturers and retail merchants can be solved, but the solution depends far more on the enterprise of our communities than upon any conceivable activity of our National Government. In the September-October issue of **Pennsylvania Planning,** a program of community self-appraisal is outlined for the use of the communities of our State in the full development of their productive capacity. How this program bears upon and can be applied to the problem of the small business man and to the problems of the community not yet fully utilizing its resources for defense or civilian production is the subject of this Bulletin.

The Problem of the Small Business

Our immediate need in these first months of war is to discover some form of production through which small manufacturers can either participate in defense or supply necessary civilian products. Manufacturers employing twenty men or less form 69 per cent of the Nation's establishments. Manufacturers employing a hundred men or less form 90 per cent of our total.

These smaller factories are vital to our State's industrial life. They can and must supply an essential part of the products now immediately needed. If they are not fully put to work in forwarding our war effort, that effort must inevitably fail to represent the full strength of our Nation.

It is also true and worth remembering that it is only through the existence of these small industries as going concerns that thousands of our communities will be able to provide employment for their people after the war is over.

Obtaining Direct Contracts for Defense Materials

Any manufacturer capable of producing materials or parts, which fall within the range of articles necessary for the use of the Army, Navy, and the United States Marine Corps, such as all types of tools, textiles, combat equipment, engineering equipment, motor transportation equipment and parts, clothing, furniture, fuel, packing or shipping supplies, chemicals, builders' hardware and materials, or plumbing and steam fitting equipment, should be listed with the Quartermaster's Department of the United States Marine Corps, with the Bureau of Supplies and Accounts of the Navy Department and with the Quartermaster's Department of the United States Army. Each of these agencies will supply information as to its requirements for obtaining a contract for military supplies, will list a manufacturers' products and will supply him with invitations to bid for materials falling within the range of his production. A similar statement may be made in regard to the Procurement Division of the United States Treasury Department which purchases material and supplies for the civilian needs of the United States Government. Information will be gladly supplied by the Pennsylvania Department of Commerce to any Pennsylvania manufacturer in doubt as to the proper method of procedure for getting into contact with Federal Agencies who might make use of his products. See note on page 14.

Subcontracts for Defense

The problem of defense subcontracts, by which small manufacturers may undertake to perform some part of a larger contract which they could not individually handle, is one on which the efforts of the Pennsylvania Department of Commerce have been largely centered. The obtaining of subcontracts for defense is generally a problem of local cooperation. It depends upon the pooling of facilities in each industrial district and on the active cooperation of the manufacturers in these districts to combine their machine tool capacity, their labor supply and their available working space for the completion of contracts which no single manufacturer in the district could carry out alone. In a number of Pennsylvania cities such pooling plans are now in active operation under the initiative of local manufacturers or under that of the State Department of Commerce which was undertaking to organize industrial pools in every manufacturing center of our State at the time when this function was taken over by the Office of Production Management.

It is often possible for individual manufacturers to make direct contact with holders of defense contracts who might make use of their products, or their specialized equipment. With this end in view the State Planning Board of the Pennsylvania Department of Commerce has compiled and is maintaining a list of all defense contracts publicly announced by the Army and Navy, both by location in the Commonwealth and by type of product. We are thus frequently able to provide manufacturers desirous of obtaining subcontracts with information as to the location of State firms now undertaking to produce the type of product for which they feel they could provide some essential element.

Small Industries Must Supply a Large Part of Our Civilian Needs

At a time when defense priorities are cutting down on our supplies of raw materials the problem of defense subcontracts is closely linked with that of industrial production for civilian needs. It is not only defense contracts that the small manufacturer should be considering at this time. The maintenance of 130,000,000 people in the United States is certain to require a very large volume of civilian production and many of the largest firms in our Country, which have been providing for our needs in the past, are now devoting their facilities exclusively to defense. This means that a considerable part of the burden and opportunity of providing the things the American people need in their daily lives must fall upon the small manufacturer.

Some, but not too many, of these smaller firms may be able to continue to produce materials they have been manufacturing in the years of peace, but many small firms must greatly modify their product to continue in existence during these years of war.

Simplification of Products Will Be Necessary to Conserve Materials and Labor

The present higher price level, and the increasing shortage of raw materials makes it inevitable that a very large number of those products to which the American people have become accustomed must be simplified in form and that unnecessary varieties of products must be eliminated. Every step which increases the production of needed civilian goods, by diminishing the labor and raw materials required in processing will be a direct addition to our resources for meeting the needs of the coming year.

The Discovery and Use of Substitute Materials Is Essential to the Continuance of Many of Our Peace Time Industries

The maintenance of production and the continuing life of many of our industries depends on the discovery of substitute materials and on the adaptation of local products not vital for military use to the satisfaction of civilian needs which until lately have consumed a large part of today's essential raw materials. A country as great in resources as the United States can, even in time of war, readily develop a surplus of many materials not needed by our military establishments. Our world dominance in the production of steel, coal, petroleum, glass, and in many important types of temperate-zone agricultural products, provides us with an enormous treasury from which substitute raw materials have already been developed in great numbers, even in the years of peace. Our ability to draw on these almost inexhaustible resources for the continuous satisfaction of our present wants is the one respect in which we differ from the inhabitants of any other nation in the world. If this war is a long continued struggle it may be necessary for Americans to adapt themselves to a diminished variety of choices as to clothes, household equipment, tools, office supplies, and electrical goods, to mention but a few lines that are certain to be directly affected. But under proper management there should not be any important scarcities in food or vital materials, whether this war ends in six months or not for ten years.

This Necessity for Substitutes Will Create Many New Industries

This search for, and development of substitute materials made necessary by the war may very well be the turning point in American economic life, and may shape its direction for a long time to come. As the first world war led to the development of our immensely powerful and self-sustaining chemical and dye stuff industries, this present war will also give rise to another phase of American industrial development. We may emerge from it an almost completely self-sustaining Nation in a completely self-sustaining hemisphere. The development and production of many varieties of synthetic rubber and of synthetic textile fiber from our abundant coal resources represents one phase of the development that is at hand. The hydrogenation of coal tars to produce motor fuel and lubricants is a form of substitution for which the United States as yet has not felt the necessity, but when the time comes for such a development we have within our country all the necessary materials for maintaining the needs of our people for liquid fuel and lubricants for an indefinite time ahead. Such changes as these are not matters for the distant future. It is likely that this war effort will so stimulate the search for substitute materials that what might have been the progress of the next generation may occur of necessity in the next two or three years.

Research Is a Vital Necessity in Solving These Problems

This search for substitute materials, like the development of simplified products are both problems of industrial research. In such a Commonwealth as our own, where both agriculture and mining have a large capacity of expansion it is vital that every research agency which can be brought to bear on the problem shall be at work today at this task of developing all the materials needed to maintain our civilian life at its highest efficiency without disturbing the free and increasing flow of military supplies.

A Large Part of This Research Must Be Devoted to the Discovery, Development, and Utilization of Local Resources

Transportation economies, shortages of imported raw materials, defense priorities, and the heavy immediate demands on our labor resources all render it imperative that the smaller industries of every community in the State make the largest possible use of the resources of their own neighborhoods. There is no community in our State without access to raw materials which might supply important national needs.

Coal, wood, iron, cement, lime, clay, sand, and petroleum are obvious raw materials. Any community in an area producing such resources and not making use of them is clearly violating a fundamental law of economy which is becoming more and more urgent.

Needless transportation is in fact today a crime against American safety. Needless hauls of goods involve losses of time, fuel, and equipment that neither our war economy nor any probable post-war economy will tolerate.

If our anthracite counties had been using anthracite as the chief raw material of their supplementary industries instead of imported silk, the whole economy of the anthracite area would today be different and more healthy. The answer to that supposition is obvious—that there is no such possible use for anthracite. The reply is also obvious—that we have not, on the scale and with the intensity the task demands, ever sought to discover and develop such uses. Researches so far conducted are meager and almost inconsequential when considered in comparison with the issues involved and the human lives affected. Yet these efforts conducted with limited facilities have already led to important industrial results.

It is clear that in these same anthracite counties, with the cheap power resources there available, there have existed a number of important industrial possibilities that have never been developed. Why, for instance should these counties, so dependent on anthracite coal, not have become a greater center for the manufacture of devices for the automatic use of anthracite, thus popularizing their region's basic product and deriving an important secondary industry from their primary industry?

Pennsylvania Agriculture Has a Great Opportunity to Provide Industrial Raw Materials

Agriculture is not very largely an experimental science, and tends to follow traditional patterns. Yet in this very fact lies one of the causes of that habitual over-production of certain types of products which costs our farmers and our Nation so dearly. The present needs of our Nation afford a remarkable opportunity for an increasing variety of product. The practical annihilation of foreign imports by the most wide-spread war in human history means that many hitherto imported agricultural products are inaccessible to our industry. Food is not today a major problem for our Nation. But drugs based on organic sources very well may be. War makes large demands on a Nation's medical resources. Large needs are certain to develop for a great variety of medicinal plants which can be grown in a temperate climate.

Large needs have already developed for certain industrial raw materials which can be produced by our State's agriculture. The castor bean has become an increasing source of lubricants and varnishes heretofore derived from tung and other imported oils. Since 1938, Harry Parker, a plant hybridizer of El Monte, California, has succeeded in developing a strain of castor plant suitable for commercial growing and harvesting in the United States. This development promises to provide American agriculture with one of its most essential technical crops. Just how important this discovery will be might be indicated by the fact that in recent years we have been importing annually nearly 147,000,000 pounds of castor beans, and in view of the prospective decline in receipts of tung oil from China, that amount would have to be very greatly increased to supply the American need for a varnish base and for gutta-percha substitutes, both of which can be made from castor oil.

Pyrenthreum powder, so important as a base for insecticides, a vital war-time necessity, has been an almost wholly imported product, yet the plant from which this valuable powder is taken is a variety of a common American wildflower, the feverfew.

Various plants capable of culture in a temperate climate have been proposed as sources for the latex from which commercial rubber is refined. The latest development in this field appears to be one of great promise, according to a report issued by Dr. Paul J. Kolachov.

This is the kok-sagyz, a Russian plant very similar to the common dandelion. It has proved to be a satisfactory source of latex, can readily be grown in a temperate climate, and is at present extensively planted in parts of Russia.

The medicinal plants or plant products needed today, according to reports received from large chemical manufacturers, include ergot, a familiar parasite on corn and other grains, henbane, belladonna leaves and roots, valerian, arnica, dandelion, and larkspur, as well as colchicum seed, large quantities of which have been hitherto supplied from temperate districts in the north of Italy. The growing of these products should, however, not be attempted without information as to the qualities and methods of preparation demanded by manufacturers of drugs. See note on page 14.

Local Industry and Agriculture Must Cooperate

The demands of our war-crowded cities for farm products must also be met by an increased activity in the canning and packaging of vegetables. But there is almost certain to develop a scarcity of tin cans.

Pennsylvania contains the best glass sands in our country. Surrounding many of the towns in the glass area of our State is a large acreage of productive farms whose soil is suited to general market gardening. With slight changes in the pattern of the agriculture of many of these regions a three phase and wholly self contained industry is possible, which would include the growing of suitable vegetable crops, the manufacturing of glass containers, and the preparation and marketing of the products.

CONCLUSION

The Pooling of Local Resources Is Vital for Defense

It is clear from the facts already presented that any system of subcontracting for defense which aims to utilize the full capacity of our productive machinery and to throw the least possible strain on the Nation's transportation, must be based on local pooling. The railroads and highways of our Nation have an immense task to perform in transporting raw materials to the point of use and finished products to the depots from which they must be distributed for the use of the Army, Navy and Marine Corps. Wastes of transportation are wastes of vital time, vital materials, and vital labor. It will be of small service to our government if the subcontracting of war materials involves a confusing problem of assembly from widely scattered sources.

But Pooling Must Be Based on Community Self Appraisal

If an economical system of subcontracting must inevitably be based on local pooling it is also true that the success of any local pooling plan depends upon the thoroughness of the industrial self-appraisal made in each producing center in our State and Nation. That fact has been demonstrated in every town, such as York, Pennsylvania, where an efficient system of subcontracting has been put into operation. A complete knowledge of every productive facility in the whole community is essential for the pooling of local resources in executing war contracts.

Community Self-Appraisal Is an Essential Form of Research for Maintaining Civilian Production

In the application to our industry of the principles of simplification and substitution, and bearing in mind always the cardinal principle of economy of transportation, it will be vital that every community in Pennsylvania should be in a position to utilize to the full every one of its potential or developed local resources. Thus the problem of maintaining and increasing our output of civilian goods and our problem of increasing the supply of military goods lead to the same conclusion, and so also does the problem of the small manufacturer and the small merchant. It is only through an intensive study by every community of all its surrounding sources of potential raw materials and through a close study of all its present facilities that today's problems can be solved.

Community appraisal is also necessary as a protection against needless emergency construction and the accumulation of post-war burdens on our communities

For communities in which defense industry is now becoming concentrated, a program of self-appraisal is very urgent. The temptation to use war emergencies as a basis for the construction of permanent public works and public facilities beyond any reasonable peace-time need can easily become a cause for great future distress and the accumulation of crushing burdens upon communities experiencing large temporary growth due to war industry. The workers who swarm into many industrial centers in such a time as this are usually not permanent residents. Yet they require all those facilities by which people anywhere maintain their health and well being. If they now contribute to the net income of the community they do so on a basis, strictly limited by the continuance of war industry. They may find in their new location much they desire to preserve. They may wish to become permanent citizens, and some of them doubtless will do so. But it can only be on the basis of opportunities developed now while the emergency is upon us that any substantial part of them can remain in a community without becoming public charges.

A community appraisal in 1942 must consider both temporary and permanent needs, and also the probability of any part of the wartime industrial population finding a permanent residence through the community's post-war peace-time industries.

Community self-appraisal is also the necessary basis for a post-war program of public works

To cushion the effect of any possible post-war depression, it is necessary that during this time of labor shortage any public construction not absolutely vital to defense should be postponed until after the close of this war. But when the war ends such a program should be ready at once. Under the most favorable circumstances the reconversion of our vast defense industry back to a peace-time basis will require a long time to accomplish. Only by a reserved public works program, carefully considered and worked out on the basis of every community's normal needs and present facilities, can we hope to take up that slack and prevent widespread unemployment.

The Tasks of Federal and Local Governments

There is a considerable confusion now existing as to the function of any agency of State or Local Government in such a struggle as that now facing the Western World. Yet there appears to be no ground to such a confusion of thinking. The present struggle, however unwelcome and unfortunate it may be for the comfortable ordering of our lives, may well serve a useful purpose of bringing back to our attention the essential nature of the American form of government.

The Federal Government Must Defend Democracy

The Federal Government now faces and must undertake the great task of defending our Nation from all external enemies and of gaining such a complete victory that our ways of life are no longer threatened from without.

But the State and Local Governments Must Maintain and Justify the System of Free Enterprise

The States, the Counties, and the minor civil divisions throughout our Country must undertake to forward that common aim with every resource at their command, but they must also undertake the present and future defense of the American way of life within their own borders. It is on their effort, on the effort of every community in our Nation that the social, economic, and political welfare in our Democracy now depends. That we will defeat the Axis powers in this war is a matter on which all Americans are determined. The efforts of the Federal Government to that end have our whole-hearted support. Yet to win this war without sacrificing our economic future, without loss of our political liberties, and without peril to our system of free enterprise, depends largely if not wholly upon the intelligence and initiative of the communities of our Nation.

What has here been presented is the unquestionable fact that in a world now almost totally engaged in war—the importance of such an effort is greatly intensified.

Research and self-appraisal and the swift adaptation of our activities to all the possibilities which we can in either of these ways discover are no longer merely advisable. Today they are vital. With a public debt mounting toward a hundred billion dollars, America's future welfare as well as its present success will no longer be the fruit of hit and run activity. Only that knowledge which is power can insure our future. It is not something out of our reach. It is something close at hand. It is our opportunity to demonstrate the practical worth of democracy—the greatest opportunity that has come in the past two generations.

NOTE: Information as to the proper Federal Procurement Offices for any type of product, as to manufacturers of specific products, or as to contracts awarded in any locality of the State will be supplied on request by the Pennsylvania Department of Commerce.

Shortages of Raw Materials

In order to make the nature of our present problem as clear as possible to all Pennsylvania manufacturers and consumers we are concluding this article with a list of imported raw materials for which we have depended on countries now involved in the war area in the Eastern Pacific. It will be seen from this table that a large part of our rubber supply, our raw silk supply, and our importations of tin and other strategically important materials have come to us in the past from the very area which is now either in Japanese control or involved in the fortunes of war. Our production of many types of products for the next year, and perhaps for several years to follow, will be largely dependent on the success with which we meet the problems occasioned by the shortages of raw materials indicated in this table, and because that is true, the facts set down here are a challenge to us all, to agriculture and to industry alike, to provide for our country every possible means for meeting these large deficiencies through the production of substitutes.

From British Malaya, China, The Netherlands Indies, French Indo China, Hongkong, Japan, Kwantung, The Philippines, and from British and French Oceania more than a quarter of all American imports have been derived in recent years, more than 90 per cent of our raw silk, nearly 90 per cent of our rubber and tin, more than 80 per cent of our tungsten, 70 per cent of our imports of vegetable oils, as well as the larger part of our receipts of many important industrial materials and manufactured products. Deficiencies in manufactured products could easily be made up in a time of peace, though to supply them in a time of war will be more difficult. It is, however, from the deficiencies of raw materials that the gravest problems of our defense effort arise. These problems must be faced by every community in this country and offer a key to economic and agricultural changes which may reshape the American future.

CHIEF AMERICAN IMPORTS

All values in thousands of dollars	Br. Malaya	China	Netherland Indies	French Indo China	Hongkong	Japan
Rubber & Manufactures	152,624	8	65,026	6,239	5	877
Raw Silk	*	*	*	*	4	100,226
Tin	79,490	5,127	4,793	24	2,223	*
Vegetable Oils & Fats	135	20,738	10,715	*	2,336	1,766
Cotton Manufactures	*	2,519	5	1	17	17,396
Copra	154	618	15,552	*	*	*
Furs—Undressed	*	9,716	1	*	*	3,127
Vegetables & Preparations	265	126	8,249	*	767	989
Wool—Unmanufactured	*	7,765	*	*	*	1
Fish & Fish Products	27	95	2	*	253	7,196
Nuts	*	595	*	*	45	62
Hides & Skins	182	5,514	1,267	50	240	21
Photographic Goods (incl. films)	*	10	1	*	32	6,119
Flax, Hemp, & Ramie	*	5,609	*	*	45	308
Pottery	*	194	*	*	41	5,429
Cotton Cloth	*	*	2	*	*	5,512
Silk—Manufactures	*	597	*	2	9	4,756
Rayon & Synthetic Textiles	*	5	*	*	3	4,595
Wood & Its Manufactures	60	271	334	*	277	1,467
Furs—Dressed & Mfg.	*	4,040	*	*	*	8
Spices	108	417	2,473	65	178	8
Tungsten	539	2,225	*	*	15	3
Toys	*	15	*	*	4	2,43
Copra—Oil, Cake, & Meal	*	*	*	*	*	*
Chrome Ore	*	*	*	*	*	*
Soy Bean—Oil, Cake, & Meal	*	158	*	*	*	9
Menthol	*	*	*	*	*	98
Peanut—Oil, Cake, & Meal	*	149	*	*	*	3
Hemp Seed—Oil, Cake & Meal	*	*	*	*	*	*
TOTAL (all imports including items not listed above)	242,819	99,428	115,315	6,489	8,744	195,08

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* Less than a thousand dollars.

ROM PACIFIC WAR ZONE

wan-ung	Philippine Islands	Br. & Fr. Oceania	Total Pacific (War Zone)	Total U. S. Imports	% of U. S. Total from Pacific	All values in thousands of dollars
*	104	1	224,884	252,859	88.94..	Rubber & Manufactures
*	*	*	100,230	108,482	92.39..	Raw Silk
*	*	*	91,657	104,418	87.78..	Tin
152	19,886	*	56,928	81,208	70.10..	Vegetable Oils & Fats
17	4,493	*	24,448	59,910	40.81..	Cotton Manufactures
*	*	1,322	17,646	17,774	99.28..	Copra
17	*	*	12,861	78,542	16.38..	Furs—Undressed
4	11	*	10,411	25,175	41.35..	Vegetables & Preparations
*	*	*	7,766	96,345	8.06..	Wool—Unmanufactured
1	35	*	7,609	33,911	22.44..	Fish & Fish Products
*	6,767	1	7,469	19,884	37.56..	Nuts
*	8	12	7,294	71,058	10.26..	Hides & Skins
*	*	*	6,162	7,889	78.11..	Photographic Goods (incl. films)
*	12	*	5,974	35,427	16.86..	Flax, Hemp, & Ramie
*	*	*	5,664	9,923	57.08..	Pottery
*	*	*	5,514	13,628	40.46..	Cotton Cloth
*	*	*	5,482	11,088	49.44..	Silk—Manufactures
*	*	*	4,605	9,321	49.40..	Rayon & Synthetic Textiles
*	1,669	*	4,384	42,421	10.33..	Wood & Its Manufactures
4	*	*	4,126	7,636	54.03..	Furs—Dressed & Mfg.
*	*	54	3,380	11,470	29.47..	Spices
*	*	*	2,813	3,392	82.93..	Tungsten
*	*	*	2,450	3,305	74.13..	Toys
*	1,820	*	1,820	1,829	99.67..	Copra—Oil, Cake, & Meal
*	491	927	1,418	7,324	19.36..	Chrome Ore
101	*	*	1,356	1,375	98.62..	Soy Bean—Oil, Cake, & Meal
*	*	*	981	1,087	90.25..	Menthol
18	*	*	198	226	87.61..	Peanut—Oil, Cake, & Meal
*	*	*	63	63	100.00..	Hemp Seed—Oil, Cake, & Meal
367	126,057	1,502	799,707	3,009,852	26.57..	TOTAL

War Brings Zoning to Crawford County

Of outstanding interest in Pennsylvania local planning and zoning is the establishment of the Crawford County Zoning Commission in December, 1941. Crawford County is the second county in the Commonwealth to take advantage of the zoning enabling legislation which was passed in 1937. The only other Pennsylvania county having a Zoning Commission is Bradford County, where a Planning and Zoning Commission was appointed in 1938 but where a zoning ordinance has not yet been enacted.

Appointment of the Crawford County Zoning Commission was occasioned by the beginning of building operations in connection with the establishment of a T.N.T. plant in a rural portion of Crawford County, approximately ten miles from Meadville. It is expected that during the construction of this factory the peak employment of between eight and ten thousand workers will cause very serious housing difficulties, with the usual sanitation problems, in Crawford County as well as in the adjoining areas. By guiding land use through the enactment of a zoning ordinance, it is hoped that permanent difficulties occasioned by this temporary boom can be minimized.

In view of the acute nature of these problems and their long-term effects upon this area, Governor Arthur H. James has authorized the Pennsylvania Department of Commerce and the State Planning Board to assist local officials in every way possible in meeting this emergency. Conferences have been held in Meadville, attended by the County Commissioners, the members of the newly appointed Zoning Commission, as well as by Clinton Stark, Field Representative of the Department of Commerce, F. A. Pitkin, Executive Director of the State Planning Board, and Russell V. N. Black, Consultant to the State Planning Board.

It is expected that the preparation of a zoning ordinance will proceed as rapidly as possible, so that this County may secure the protection of zoning before the peak of employment in this defense factory occurs.

Other communities in Pennsylvania which are experiencing rapid population shifts due to defense activities may well profit by the example now being set by Crawford County.

BOOK REVIEWS

Memoria, Ministerio De Obras Publicas, Provincia De Cordoba (Correspondiente Al Ejercicio 1938-1939) (Argentine Republic).

This report of the Minister of Public Works in the State of Cordoba, Argentine Republic, not only sets a very high standard as a state report of progress in public improvement, but also makes clear how extremely progressive the people of the Argentine Republic are in the undertaking of all of the important activities of a state government.

In the promotion of agriculture, in the study of the topography of their area, and of its geology and mineral resources, in the development of its roads and canals and water resources, and in the study of the mining problems of the Republic, it displays a highly progressive point of view.

The search for further resources of tungsten, bismuth, vanadium, beryllium, and uranium now being conducted in the Province may be of great importance in the future.

One of the most progressive activities revealed by this report is that of the Cordoban Tourist Bureau organized to promote travel throughout that very beautiful section of the Southern Continent. The program of this tourist bureau includes publication of maps and illustrative material, the promotion of regional fiestas and camping activities throughout the Province, and the study of the areas of historic, scientific, and economic interest which would attract visitors from other parts of the world.

This volume is illustrated by a number of drawings of the schools, administrative buildings, and recreational centers which have recently been erected in Cordoba. The architecture is marked by an admirable originality and takes its place beside the best modern work of North America or Europe.

The Economic Almanac for 1941-42, Published by The National Industrial Conference Board, 247 Park Avenue, New York City, New York.

This Almanac is a compendium of economic data in regard to industrial and labor relations, general business conditions, costs of living, industrial output, population, national wealth and income, and public and private debt.

In it has been gathered a large body of economic and social information, which is particularly useful because of the effort evidenced throughout the more than 400 pages of this book to eliminate the statistical lag which is so unfortunate in the data of many similar publications. This is a matter of particular importance in such a year as this, when trends of production and distribution have so rapidly changed.

Business Research Projects—1941, Published by the United States Department of Commerce, United States Government Printing Office, Washington, D. C. (170 pp)

This is an index of current research projects being conducted by the educational and research institutions of the United States.

The subjects of these studies have been classified and briefly summarized, so that it is possible to find readily the leading current economic and industrial research projects now under way in our country.

This is an extremely valuable service not only as a guide to sources of information, but also to prevent an unnecessary duplication of effort in all directions of economic and social study.

The Presidents and Civil Disorder, By Bennett Milton Rich, Published by The Brookings Institution, Washington, D. C.

This study of all those civil disturbances in the United States which have involved military intervention by the general government provides an interesting sidelight on an important phase of American History.

Beginning with the Shays Rebellion in the days of the Continental Congress, and the Whiskey Insurrection of 1794, this book traces through the whole course of American History these unhappy outbreaks in which the temper of the American people rose to a point beyond the control of local authority.

As some of these outbreaks have been important in the direction they gave to the current of American History, and as the means employed to control them have always been matters of high importance from the standpoint of civilian and national rights, this book provides interesting reading to any student of American History, and it is somewhat astonishing that such a work has not been undertaken before.

Naturally the reader will be particularly concerned with the civil outbreaks which have occurred, in the past, in his own part of the nation. To Pennsylvanians the account of the Whiskey Rebellion which is generally familiar, and of Fries's Rebellion which is not, are of particular interest.

The accounts of the Buckshot War of 1838 which established the right of the President to control an insurrection within a state provided the state made proper application for Federal assistance, of the great riots of 1877 in which nine Governors called on the President to maintain the peace in their states at the time of the first great industrial strike in our nation's history, and of the outbreaks occurring during the recent postwar period, all deal with important stages in the development of our present national authority.

PLANNING PROGRESS IN THE HARRISBURG REGION

The Harrisburg Regional Planning Commission has recently been organized, with Floyd A. Carlson, who was formerly City Plan Engineer of Kenosha, Wisconsin, as its Executive Director. The Commission is supported by Dauphin and Cumberland Counties, the City of Harrisburg, the Boroughs of Camp Hill, Lemoyne, New Cumberland, Paxtang, Penbrook, West Fairview and Wormleysburg, and the Townships of Lower Paxton, Susquehanna, Swatara, East Pennsboro, Hampden and Lower Allen.

The Commission is composed of 19 members, who meet quarterly with an Executive Committee of 7 which meets biweekly.

The Commission is very active in aiding communities in defense planning activities. In the Harrisburg area are located many defense industries. The resulting problems have recently become more acute due to additional large scale construction. As a result, Mechanicsburg has asked to become a member, and is now appointing a Planning and Zoning Commission. The County of Cumberland is also arranging to appoint an official County Planning and Zoning Commission.

The Commission is engaged in making a zoning study for New Cumberland, study of a new elevated express highway in Harrisburg. It is aiding in establishing a House Registration Office for both Cumberland and Dauphin County, in making a comprehensive city plan and zoning ordinance for Mechanicsburg, in planning and zoning study of Cumberland County and is preparing detailed plans of critical highway intersections in the City of Harrisburg. Due to acute transportation problems, a study will be made of the possibility of staggering working hours of employees concentrated in the central business district of Harrisburg.

PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report, 682 pages, 152 charts, December 1934.
2—A Standard System of Plane Coordinates for Pennsylsylvania, January, 1936.
3—A Standard System of Plane Coordinates for Pennsylsylvania, Non-Technical Explanation, December, 1936.
4—Progress Report, Pennsylvania State Planning Board, December, 1936.
5—Research and Planning Program, December, 1936.
6—An Analysis of the Status of Mapping in Pennsylvania, December, 1936.
7—Municipal Borrowing Power, Debts and Unemployment, February, 1937.
8—Problem Areas in Pennsylvania, March, 1937.
9—Cameron County, an Analysis of Problems, 1937.
10—Drainage Basin Study, 1937.
11—Planning and Zoning, Powers and Procedures in Pennsylvania, 1938, Volume I.*
12—Planning and Zoning, Powers and Procedures in Pennsylvania, 1938, Volume II.*
13—The Pennsylvania Zoning Primer, 1940, Volume III.*

In addition to these publications the following issues of **Pennsylvania Planning** are of special pertinence:

Planning Directory, May-June, 1939.*
County Data, July, 1939.*
Annual Report Number, January-February, 1940.*
Local Tax Rates, May-June, 1940.*
Machine Tool Industry, August, 1940.*
Bituminous Coal Study, September, 1940.*
Air Photography, November, 1940.*
Roadside Improvement, December, 1940.*
Defense Problems, January-March, 1941.*
Post-Defense Problems, April-June, 1941.*
Index of Publications, August, 1941.*
Community Self-Appraisal, September-October, 1941.*

These publications may be seen in representative public libraries. A limited number of those which are marked with an asterisk (*) are available for distribution.

Many other reports, maps and graphic presentations have been made. These are not available for distribution, but can be seen at the Planning Board offices.

A YEAR FROM NOW
WHAT WILL WE WISH
WE HAD DONE TODAY?

Donald Marr Nelson's wall motto in the
office of the War Production Board

PENNSYLVANIA PLANNING

DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

MAY · 1942 — #4

COMPARATIVE COUNTY DATA

814

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COMMONWEALTH OF PENNSYLVANIA

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PENNSYLVANIA DEPARTMENT OF COMMERCE

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

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PENNSYLVANIA DEPARTMENT OF COMMERCE
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Editorial

In the July 1939 issue of **Pennsylvania Planning** was published a series of tables of county data for which the demand was so large that a special reprint of that number was made necessary. In the following pages this series of county data has been completely revised.

Changing conditions have necessitated some alterations in the lists of information included in these tables, and data from the 1940 census supersedes the population estimates necessary in 1939.

Both as a war-time preparation to meet fully the demands of 1942, and as a preparation for facing the problems of the post war world, a thorough appraisal of the economic and social position of every community in our Commonwealth is an urgent necessity.

The September-October 1941 and the November 1941-January 1942 issues of **Pennsylvania Planning** have been devoted to a development of the needs and methods of conducting such a community survey, and the Department of Commerce has also published for limited distribution a pamphlet, "Community Self-Appraisal," now in its second printing.

◆

Statistical Bases for Community Planning and Self-Appraisal

The following tables provide a background for a study of the special problems of the people of every county in Pennsylvania. They represent outstanding facts of community importance as to the population, agriculture, industry, business, land use, recreation, purchasing power, and financial resources of the State's sixty-seven counties. Such a listing of data must inevitably be incomplete from mere limitations of space.

Further data on almost every item, or class of item, included in these tables are on file and available on request from the State Planning Board. As a means of establishing each county's status in regard to each of the items here listed, the counties have been ranked, wherever such a ranking is practicable, and the State's total or average has been noted at the foot of each column.

All that can be attempted here is a brief survey of some of the significant items in each group of tables, and a general summary as to changes noted since the first publication of these lists.

Population

Pennsylvania is one of the oldest of the American States in point of settlement, and perhaps more than any other American State has, in its earlier years, supplied population to the growing areas of the West. Its rate of growth, like that of our country as a whole, has very considerably declined in the last 30 years.

Notable progress has, however, been made during the past decade in the reduction of the State's death rate, and particularly its infant mortality, and in the control of tuberculosis, and of many epidemic diseases.

The full results of the census of 1940, as it concerns Pennsylvania's population picture, have not yet been made public, but data now available reveal many striking changes in the population patterns of the State.

In common with all the industrial states of the east and with the Nation as a whole, Pennsylvania, in the 20 years following 1921, has experienced a drastic and progressive decline in the number of its births, and in the percentage of its population five years of age and under. In 1920, 11.47% of our State's population was under five years of age. By 1930 that percentage had declined to 9.30%. By 1940 it had further declined to 7.33%, the lowest point in the history of the Commonwealth.

Recent reports of a rise in the number of Pennsylvanian and of all American births in the latter months of 1941 and in 1942 do not necessarily indicate a change in this trend. The very high number of births, 20 to 25 years ago, when all-time records were reached in the numbers born, are necessarily reflected in an unusually high number of marriages recorded this and last year. That the long term downward trend of the birth rate has altered to a long term upward trend is not likely.

Births in 1940 totalled 165,689, which represents a rise of 8,643 over the lowest figure in recent years (157,046 in 1933) but is still about 23% below the actual number born in 1910, when the population of the Commonwealth was 2,235,071 less than in 1940. This drastic change has occurred slowly and imperceptibly, and yet is of great importance to the Commonwealth and to our individual communities in many of which the proportional decline in births is far more drastic than in the State as a whole.

Parallel with this 20-year decline in births, has occurred a steady increase in the average age of our population. Also, partly as a result of restrictions on immigration, a gradual but perceptible decline in the percentage of males in our State's population which had resulted, by 1940, in an almost exact balance in the number of the State's male and female population, the percentage of males in 1940 being 50.01.

A considerable rise in the percentage of males in Union County in 1940 in comparison with its low ratio in 1930 is occasioned in part by the inclusion of the population of the Western Penitentiary in the county's 1940 total.

While the areas in our State where the largest percentage of the aged and the very young are to be found, as illustrated in maps (Plate I, page 13), have not generally changed in the past 10 or even 20 years, certain shifts have occurred which are of great interest. Broadly speaking, the counties in the east and west of the State have lost relatively more of their youngest population than the counties of the central area of the State and those of the northern tier. The most extreme relative losses occurred in Beaver, Mercer, and Westmoreland Counties in the west and in Carbon, Schuylkill, Lackawanna, Luzerne, and Northampton in the east, while only Crawford, Tioga, and Forest Counties actually increased their percentage of those under five, during the 10 years from 1930 to 1940.

It is evident that the demand for both military and industrial man power bears heaviest on areas where there is a comparative deficiency of those in the age group 21-45, or where a very high percentage of all persons employed in industry are male.

In such a time of national emergency as now prevails our reserve supply of female workers is of great importance to the war effort, yet the industrial pattern in many sections of our State has, in the past, afforded few opportunities for the employment or training of women workers.

Manufacturing and Extractive Industry

In the production of many, if not most, of the basic materials of our modern industrial life, Pennsylvania has an unchallenged leadership among the American States. It is well known that in its output of coal, steel, iron, glass, refractories, cement, and cement products the State exceeds not only all others in our Union, but also nearly all foreign nations. It is not so well known, nor so frequently mentioned, that Pennsylvania's leadership extends to a great variety of other industries not dependent on either mining or metals.

Its production of knitted goods, of silk and rayon yarns, of hosiery, and many varieties of textiles exceeds that of any other State.

In years of war the demands made by our Nation on Pennsylvania industry have frequently exceeded those on any other part of our Nation and it is probable that this war will furnish no exception. The State's leadership in the production of coke, and coke by-products, such as light oil, toluol, and ammonium sulphate, as well as the large capacity of its ship yards, of its clothing factories, and of its hundreds of miscellaneous industries, makes its output vital to the success of any American war effort.

The tables here presented are rather a record of the last normal year of Pennsylvania's recent industrial history than any proper evidence of the extent of the State's present efforts. Before the close of 1941 it is estimated that at least one-fourth of all Pennsylvania's output was being devoted to military production. It is likely that before the close of 1942 at least 50% of the State's production will be of military materials or of products to be manufactured into military materials. Such a wholesale conversion of a great State's industries has already resulted in considerable changes in its employment distribution, and in the demand for particular types of its products.

In addition to the tables of values, there is also included a table of operating ratios by county which may serve as some measure of various industrial factors affecting each county's economic welfare.

(Continued on page 28)

TABLE I—POPULATION—1940

County	(1-USC) Population	Rank	(2-USC) Population Density (Per Square Mile)	Rank	(3-USC) Growth Rate (1930-1940)	Rank	(4-VS) Adjusted* Birth Rate (Per 1,000)	Rank	(5-VS) Adjusted† Death Rate (Per 1,000)	Rank
Adams	39,435	48	75.0	42	6.2	30	18.23	30	10.42	50
Allegheny	1,411,539	2	1,933.6	2	2.7	49	16.44	48	10.69	43
Armstrong	81,087	30	122.9	29	2.3	51	19.76	16	9.04	67
Beaver	156,754	19	355.5	9	5.2	37	16.42	50	9.17	66
Bedford	40,809	47	40.1	58	9.4	12	20.56	9	11.42	31
Berks	241,884	8	280.0	14	4.4	39	13.78	65	11.46	30
Blair	140,358	20	264.8	16	.4	55	18.49	26	11.55	25
Bradford	50,615	42	44.1	52	3.2	43	17.15	45	12.43	11
Bucks	107,715	23	174.6	25	11.4	7	13.73	66	10.98	39
Butler	87,590	28	110.3	31	8.8	13	17.60	36	11.18	36
Cambria	213,459	10	307.1	11	5.1	38	19.70	18	10.12	54
Cameron	6,852	66	17.1	63	29.1	1	17.22	42	11.53	27
Carbon	61,735	37	152.4	26	—2.6	65	15.08	57	11.26	35
Centre	52,608	40	47.2	49	13.6	5	20.02	12	9.62	60
Chester	135,626	21	178.5	24	7.1	22	16.43	49	12.59	8
Clarion	38,410	49	64.1	44	11.2	8	21.87	2	10.36	52
Clearfield	92,094	27	80.5	38	6.2	31	21.43	5	10.16	53
Clinton	34,557	51	38.3	60	6.9	24	21.47	3	10.45	51
Columbia	51,413	41	106.2	32	5.3	34	17.54	37	11.42	32
Crawford	71,644	34	70.5	43	13.8	4	19.56	20	12.58	9
Cumberland	74,806	32	134.8	28	9.6	11	18.03	31	11.64	24
Dauphin	177,410	17	341.2	10	7.4	18	14.83	60	11.79	22
Delaware	310,756	4	1,679.8	3	10.9	9	14.71	63	9.53	61
Elk	34,443	52	42.6	53	3.0	45	18.23	29	9.76	59
Erie	180,889	14	222.8	21	3.2	44	17.98	33	11.96	18
Fayette	200,999	13	251.2	18	1.2	53	20.11	11	9.22	65
Forest	5,791	67	13.8	66	11.8	6	20.55	10	12.26	14
Franklin	69,378	35	92.0	36	6.7	26	17.92	34	10.62	46
Fulton	10,673	63	24.5	62	15.6	3	23.24	1	10.49	48
Greene	44,671	43	77.4	40	7.0	23	19.74	17	9.38	63
Huntingdon	41,836	46	46.7	51	7.2	21	21.39	6	11.38	33
Indiana	79,854	31	96.1	34	5.9	32	19.79	15	9.87	57
Jefferson	54,090	39	83.0	37	3.8	41	19.99	14	10.89	41
Juniata	15,373	62	39.7	59	7.3	19	20.88	7	12.81	7
Lackawanna	301,243	6	663.5	4	—3.0	66	14.70	62	11.10	38
Lancaster	212,504	11	224.9	20	7.9	16	17.99	32	11.80	20
Lawrence	96,877	25	264.0	17	—.4	60	17.06	46	9.81	58
Lebanon	72,641	33	200.1	22	8.3	15	18.85	23	11.67	23
Lehigh	177,533	16	511.6	6	2.7	50	14.28	64	11.10	37
Luzerne	441,518	3	495.5	7	—.8	62	15.43	54	10.92	40
Lycoming	93,633	26	77.1	41	.2	57	19.05	22	11.35	34
McKean	56,673	38	56.8	47	2.7	48	17.36	39	10.09	55
Mercer	101,039	24	148.4	27	1.8	52	17.63	35	11.52	29
Mifflin	42,993	44	99.8	33	6.5	27	21.47	4	10.65	45
Monroe	29,802	55	48.8	48	5.4	33	16.37	51	12.28	13
Montgomery	289,247	7	597.6	5	8.8	14	15.33	55	10.75	42
Montour	15,466	61	119.0	30	6.5	28	16.29	52	14.22	4
Northampton	168,959	18	451.8	8	—.2	59	17.29	40	10.49	49
Northumberland	126,887	22	279.5	15	—1.3	64	15.19	56	11.52	28
Perry	23,213	56	42.2	54	6.8	25	19.56	19	11.80	19
Philadelphia	1,931,334	1	14,306.2	1	—1.0	63	14.90	59	12.34	12
Pike	7,452	65	13.7	67	—.4	61	6.98	67	15.83	1
Potter	18,201	59	16.7	64	4.1	40	18.35	27	11.54	26
Schuylkill	228,331	9	291.6	13	—3.0	67	17.19	44	11.79	21
Snyder	20,208	58	61.4	46	7.3	20	19.40	21	12.02	17
Somerset	84,957	29	78.4	39	5.2	36	20.00	13	9.48	62
Sullivan	7,504	64	15.7	65	.1	58	18.66	24	12.53	10
Susquehanna	33,893	53	40.5	56	.3	56	15.49	53	12.21	15
Tioga	35,004	50	30.4	61	9.8	10	18.31	28	12.86	6
Union	20,247	57	63.7	45	15.9	2	16.84	47	10.52	47
Venango	63,958	36	94.8	35	1.2	54	17.21	43	12.18	16
Warren	42,789	45	47.0	50	3.2	42	15.07	58	14.72	3
Washington	210,852	12	246.0	19	3.0	46	18.63	25	9.89	56
Wayne	29,934	54	40.2	57	5.3	35	14.77	61	12.86	5
Westmoreland	303,411	5	296.0	12	2.9	47	17.23	41	9.24	64
Wyoming	16,702	60	42.2	55	7.6	17	20.66	8	14.79	2
York	178,022	15	194.8	23	6.5	29	17.49	38	10.66	44
State	9,900,180		219.8		2.8		16.59		11.12	

* Adjusted to residence of mothers.
† Adjusted to residence of decedents.

For sources of data see inside back cover.

TABLE I—POPULATION—1940 (Continued)

County	(6-USC) Per Cent Under Five	Rank	(7-USC) Per Cent Five to Twenty	Rank	(8-USC) Per Cent Twenty-one to Sixty-four	Rank	(9-USC) Per Cent Sixty-five and Over	Rank	(10-USC) Per Cent Male	Rank
Adams	8.70	22	30.35	28	52.02	49	8.92	17	50.00	48
Allegheny	6.92	59	27.47	55	59.79	5	5.82	58	49.99	49
Armstrong	9.01	13	32.52	10	51.71	52	6.76	50	51.41	18
Beaver	8.04	34	30.92	22	56.13	19	4.92	67	51.92	9
Bedford	9.94	3	32.42	11	49.97	63	7.67	35	51.38	19
Berks	6.40	65	26.39	62	59.24	2	7.97	31	49.87	53
Blair	7.64	41	29.66	35	55.25	28	7.45	39	49.43	58
Bradford	8.31	28	28.70	43	52.15	47	10.84	2	50.08	46
Bucks	7.05	56	27.96	51	56.42	16	8.57	22	50.70	33
Butler	8.42	26	30.45	27	53.35	40	7.77	33	51.02	27
Cambria	8.92	17	33.82	3	52.19	46	5.07	66	51.43	17
Cameron	7.78	40	28.11	47	56.89	13	7.22	43	48.56	67
Carbon	6.98	57	32.19	14	55.09	29	5.73	61	50.74	32
Centre	9.43	6	30.47	26	52.67	43	7.43	40	51.20	25
Chester	7.44	45	28.13	46	56.28	18	8.15	28	50.96	28
Clarion	9.82	4	32.24	13	49.33	66	8.61	21	51.45	16
Clearfield	9.64	5	33.44	6	49.69	65	7.23	42	51.22	24
Clinton	8.87	20	29.98	32	53.23	41	7.92	32	50.95	29
Columbia	7.58	44	29.59	37	54.43	37	8.39	24	50.45	40
Crawford	8.32	27	26.95	58	54.77	33	9.95	10	50.69	34
Cumberland	7.82	39	28.05	48	55.64	26	8.48	23	49.50	57
Dauphin	6.43	64	25.88	64	60.04	4	7.64	37	49.19	61
Delaware	6.80	60	26.44	61	60.58	3	6.17	55	49.04	64
Elk	8.54	23	32.63	9	51.99	50	6.84	48	51.94	8
Erie	7.60	43	27.69	52	57.33	11	7.38	41	50.32	42
Fayette	8.91	18	34.23	1	51.47	54	5.39	64	51.25	21
Forest	10.31	2	28.86	41	51.08	57	9.76	11	52.82	2
Franklin	8.01	35	29.77	34	53.94	39	8.27	25	49.87	52
Fulton	10.92	1	32.74	8	48.66	67	7.69	34	51.49	14
Greene	9.43	7	33.61	4	50.26	61	6.70	51	51.19	26
Huntingdon	9.07	12	33.12	7	50.64	58	7.17	44	52.02	7
Indiana	9.30	9	34.14	2	50.20	62	6.35	54	51.46	15
Jefferson	8.96	14	32.26	12	50.59	59	8.19	26	50.64	36
Juniata	8.94	16	31.87	15	50.47	60	8.72	19	50.55	37
Lackawanna	6.95	58	30.06	31	57.20	12	5.80	60	49.66	55
Lancaster	8.09	33	28.05	49	54.98	31	8.88	18	49.05	63
Lawrence	7.42	46	30.63	25	55.27	27	6.69	52	50.41	41
Lebanon	8.18	31	29.00	39	54.69	35	8.13	29	49.42	59
Lehigh	6.77	62	27.16	57	58.99	7	7.09	46	49.51	56
Luzerne	7.23	52	31.85	16	55.77	23	5.14	65	50.04	47
Lycoming	7.31	49	27.55	54	56.09	20	9.05	15	49.26	60
McKean	8.48	24	28.45	45	55.91	21	7.17	45	50.68	35
Mercer	7.34	48	29.36	38	55.64	25	7.66	36	50.80	31
Mifflin	9.37	8	31.62	17	53.18	42	5.83	57	49.91	50
Monroe	7.30	50	27.17	56	56.43	15	9.10	14	50.18	45
Montgomery	6.54	63	26.79	59	59.07	6	7.60	38	48.88	65
Montour	7.16	53	24.52	67	57.75	8	10.57	4	49.06	62
Northampton	6.77	61	28.78	42	57.62	9	6.83	49	50.28	44
Northumberland	7.86	38	31.09	21	54.68	36	6.37	53	50.31	43
Perry	8.73	21	30.88	23	51.36	55	9.03	16	50.54	38
Philadelphia	6.33	66	24.99	66	61.64	1	7.04	47	48.80	66
Pike	5.68	67	25.46	65	56.75	14	12.12	1	51.34	20
Potter	8.47	25	28.93	40	51.87	51	10.72	3	52.06	5
Schuylkill	7.26	51	31.49	18	55.85	22	5.40	63	50.85	30
Snyder	8.96	15	30.09	30	52.31	44	8.65	20	51.51	13
Somerset	9.18	10	33.50	5	51.20	56	6.12	56	51.81	10
Sullivan	8.89	19	30.72	24	49.95	64	10.45	5	52.04	6
Susquehanna	8.29	30	30.35	29	52.14	48	9.21	12	51.69	12
Tioga	9.13	11	28.52	44	52.24	45	10.11	9	51.24	22
Union	7.11	54	26.35	63	57.40	10	9.14	13	52.08	4
Venango	7.91	37	29.65	36	54.29	38	8.15	27	49.69	54
Warren	7.37	47	26.50	60	55.74	24	10.39	6	50.47	39
Washington	8.14	32	31.42	19	54.76	34	5.68	62	51.80	11
Wayne	7.07	55	27.59	53	55.05	30	10.29	7	52.87	1
Westmoreland	8.00	36	31.32	20	54.86	32	5.82	59	51.24	23
Wyoming	8.29	29	29.83	33	51.69	53	10.19	8	52.22	3
York	7.62	42	28.00	50	56.30	17	8.08	30	49.90	51
State	7.33		28.51		57.32		6.84		50.01	

TABLE II—MANUFACTURING AND EXTRACTIVE INDUSTRY—1940

County	(1-IA) Establishments	Rank	(2-IA) Total Employees	Rank	(3-IA) Total Compensation	Rank	(4-IA) Capital Invested	Rank
Adams	98	35	5,944	39	$4,113,800	48	$6,966,700	**47**
Allegheny	1,946	2	206,393	2	338,345,000	2	1,005,558,700	**1**
Armstrong	86	39	9,938	30	13,646,200	30	31,016,200	**28**
Beaver	193	22	33,566	13	58,928,100	8	162,010,800	**5**
Bedford	52	51	1,001	58	1,065,500	55	3,453,800	**54**
Berks	555	5	51,048	4	58,251,500	9	91,169,200	**12**
Blair	157	25	18,862	20	28,651,200	20	49,844,100	**19**
Bradford	50	53	4,092	45	5,581,600	45	9,698,500	**46**
Bucks	231	17	15,199	22	18,008,200	24	32,700,800	**27**
Butler	112	30	8,560	34	12,547,300	31	43,039,300	**22**
Cambria	234	16	39,674	8	54,870,300	10	133,989,200	**7**
Cameron	7	67	2,269	53	2,495,200	53	2,390,200	**56**
Carbon	91	37	12,064	28	15,034,400	28	15,742,000	**41**
Centre	78	42	4,077	47	4,374,100	47	8,603,300	**48**
Chester	201	20	14,658	24	18,632,800	23	32,857,300	**26**
Clarion	54	49	2,578	51	2,858,400	52	4,296,500	**51**
Clearfield	124	39	9,619	31	9,897,900	34	18,751,400	**37**
Clinton	64	44	5,587	41	6,262,900	43	20,248,600	**35**
Columbia	109	32	8,741	33	8,724,700	36	17,163,800	**39**
Crawford	97	36	9,977	29	14,360,600	29	30,622,200	**29**
Cumberland	142	26	8,256	35	8,720,000	37	11,028,800	44
Dauphin	341	11	24,340	19	30,987,900	19	58,962,000	15
Delaware	256	15	37,768	9	65,169,800	5	175,179,100	4
Elk	55	48	5,873	40	7,797,100	39	20,968,300	34
Erie	367	10	30,298	15	46,258,800	12	72,070,400	13
Fayette	159	24	24,824	18	35,087,400	16	44,111,800	21
Forest	11	63	463	63	586,900	62	1,223,100	59
Franklin	131	27	8,758	32	10,308,000	33	15,797,200	40
Fulton	10	64	282	66	315,500	65	439,000	66
Greene	29	58	4,448	44	6,873,100	41	29,765,700	30
Huntingdon	57	47	3,871	49	3,928,800	49	5,999,300	49
Indiana	86	39	8,233	36	10,497,500	32	28,203,800	31
Jefferson	80	42	4,084	46	4,829,300	46	9,742,500	45
Juniata	30	57	817	60	529,400	63	721,400	64
Lackawanna	408	8	30,940	14	37,153,600	14	95,608,300	11
Lancaster	562	4	34,493	11	36,432,500	15	56,615,000	17
Lawrence	126	29	13,564	26	20,539,700	22	40,663,300	23
Lebanon	206	18	14,555	25	15,966,000	26	33,065,700	25
Lehigh	371	9	29,341	16	32,068,400	17	48,323,100	20
Luzerne	461	7	64,995	3	74,668,900	3	184,990,000	3
Lycoming	187	23	13,164	27	15,240,800	27	24,352,400	33
McKean	106	33	5,171	43	6,393,500	42	19,334,500	36
Mercer	131	27	14,807	23	24,079,100	21	55,681,100	18
Mifflin	63	45	7,134	38	9,555,700	35	24,805,600	32
Monroe	63	45	2,559	52	3,033,800	51	4,006,300	52
Montgomery	541	6	44,595	6	59,242,800	6	102,102,500	10
Montour	24	61	777	61	674,600	60	1,934,500	57
Northampton	321	14	44,424	7	59,028,000	7	127,978,700	8
Northumberland	206	18	16,775	21	17,232,200	25	36,878,500	24
Perry	47	52	657	62	538,900	62	902,700	62
Philadelphia	5,282	1	285,825	1	400,258,200	1	722,668,500	2
Pike	10	64	121	67	104,400	67	193,200	67
Potter	27	60	1,236	54	1,052,600	56	3,557,400	53
Schuylkill	326	12	27,353	17	31,078,400	18	58,239,200	16
Snyder	47	52	1,138	55	721,100	59	1,158,300	61
Somerset	99	34	7,474	37	7,959,700	38	12,225,800	43
Sullivan	8	66	287	65	179,800	66	562,200	65
Susquehanna	28	59	1,003	57	1,189,200	54	2,586,400	55
Tioga	38	56.	3,086	50	3,475,900	50	5,085,000	50
Union	40	55	1,137	56	1,019,100	57	1,608,700	58
Venango	82	41	5,252	42	7,515,400	40	18,523,800	38
Warren	87	38	4,076	48	5,835,200	44	14,588,200	42
Washington	200	21	33,857	12	50,334,600	11	142,006,200	6
Wayne	42	54	849	59	740,900	58	867,900	63
Westmoreland	324	13	45,922	5	69,002,500	4	122,475,800	9
Wyoming	18	62	452	64	465,600	64	1,218,300	60
York	578	3	35,870	10	38,725,500	13	64,299,200	13
State	17,355		1,419,051		$1,940,045,800		$4,223,471,300	

For sources of data see inside back cover.

TABLE II—MANUFACTURING AND EXTRACTIVE INDUSTRY—1940 (Continued)

County	(5–IA) Value Added by Manufacture	Rank	(6–IA) Value of All Products	Rank	(7–IA) Value of Mine and Quarry Products	Rank	(8–IA) Per Cent of Employees Male	Rank
Adams	$6,698,100	44	$13,914,200	46	$495,800	42	50.10	64
Allegheny	539,610,600	2	1,310,555,700	2	30,564,900	7	91.49	23
Armstrong	24,111,000	24	44,357,600	30	9,027,900	14	93.40	18
Beaver	101,152,400	7	231,846,500	4	1,227,300	31	96.34	11
Bedford	792,300	61	2,452,900	60	1,450,400	28	95.77	13
Berks	80,868,400	9	167,109,300	9	746,700	34	65.90	55
Blair	25,393,300	23	81,598,700	19	717,400	36	89.07	26
Bradford	8,774,100	42	22,481,000	41	—	—	79.09	37
Bucks	31,101,600	18	65,146,700	23	1,499,200	27	62.73	60
Butler	21,800,200	27	54,602,300	27	2,625,100	22	96.86	7
Cambria	45,142,000	15	149,582,600	11	35,163,700	4	94.91	15
Cameron	3,856,500	48	6,264,400	53	4,500	63	34.31	67
Carbon	11,133,600	36	33,492,600	34	9,385,900	13	81.43	32
Centre	6,113,500	45	12,710,400	47	1,892,700	25	88.71	27
Chester	29,746,500	19	71,304,100	21	445,900	44	78.15	40
Clarion	3,669,400	49	8,294,900	52	2,000,500	24	98.53	6
Clearfield	6,983,000	43	21,753,000	42	5,888,200	15	92.21	21
Clinton	9,792,300	38	26,634,100	37	144,800	51	90.69	24
Columbia	15,330,900	30	38,442,200	32	1,195,700	32	72.06	48
Crawford	26,150,800	21	46,084,500	28	123,000	53	80.19	35
Cumberland	11,298,100	35	31,644,900	35	551,400	39	63.94	59
Dauphin	55,356,400	12	130,032,500	15	3,227,200	20	72.66	46
Delaware	114,281,700	3	290,121,000	3	515,900	41	87.34	29
Elk	9,649,500	40	24,280,600	39	1,409,300	30	93.32	19
Erie	88,432,600	8	165,045,000	10	173,300	50	87.32	30
Fayette	11,419,500	34	66,001,600	22	42,259,100	3	96.20	12
Forest	1,162,500	54	3,217,600	57	—	—	100.00	1
Franklin	19,070,600	28	34,304,600	33	221,200	48	65.26	56
Fulton	31,300	67	475,100	66	391,500	46	100.00	1
Greene	395,600	64	11,809,900	48	11,155,700	12	99.79	3
Huntingdon	4,495,100	47	8,618,500	51	2,406,400	23	81.10	33
Indiana	1,896,300	51	18,956,600	44	15,045,300	10	98.93	5
Jefferson	2,649,600	50	10,475,000	49	3,419,000	18	92.00	22
Juniata	713,500	62	1,088,200	64	31,300	52	38.95	66
Lackawanna	24,476,900	24	83,676,500	18	31,076,700	6	70.49	51
Lancaster	65,511,200	11	135,817,100	14	637,400	37	64.33	58
Lawrence	29,482,500	20	63,764,400	24	3,716,500	17	87.99	28
Lebanon	25,496,700	22	55,307,100	25	5,113,900	16	65.09	57
Lehigh	47,183,100	13	117,609,500	16	810,100	33	61.37	61
Luzerne	41,918,800	16	177,569,800	8	89,602,300	1	80.14	36
Lycoming	23,202,400	26	54,685,100	26	530,000	40	73.34	45
McKean	10,972,300	37	28,258,900	36	75,700	56	80.81	34
Mercer	41,441,700	17	104,370,000	17	426,800	45	96.48	9
Mifflin	14,730,700	31	24,048,600	40	741,400	35	71.19	49
Monroe	4,611,400	46	8,677,400	50	74,000	57	76.75	41
Montgomery	101,982,600	5	215,331,100	6	3,342,800	19	71.02	50
Montour	1,098,100	55	2,093,700	62	200,900	49	78.70	38
Northampton	101,663,100	6	196,533,100	7	2,687,900	21	73.74	44
Northumberland	13,616,200	33	45,616,600	29	17,105,300	8	75.74	42
Perry	813,500	60	1,670,500	63	42,600	58	55.56	62
Philadelphia	710,325,700	1	1,569,028,900	1	1,422,300	29	67.31	54
Pike	74,800	66	309,000	67	—	—	75.70	43
Potter	1,508,900	52	4,334,800	54	—	—	78.46	39
Schuylkill	16,128,900	29	80,094,600	20	43,047,700	2	72.11	47
Snyder	975,600	58	2,143,600	61	33,500	61	53.93	63
Somerset	1,050,800	57	14,877,100	45	12,415,200	11	96.47	10
Sullivan	273,400	65	723,600	65	77,700	55	94.56	17
Susquehanna	685,400	63	3,034,200	58	622,500	38	82.93	31
Tioga	9,065,900	41	20,675,500	43	447,500	43	90.09	25
Union	1,323,000	53	3,858,000	55	105,800	54	70.32	52
Venango	13,844,600	32	41,067,900	31	257,900	47	95.68	14
Warren	9,769,400	39	24,409,500	38	39,600	59	96.65	8
Washington	45,640,200	14	146,370,500	12	34,883,600	5	94.59	16
Wayne	1,093,600	56	2,954,400	59	38,800	60	46.79	65
Westmoreland	102,010,100	4	221,435,000	5	16,021,800	9	93.29	20
Wyoming	917,100	59	3,239,200	56	130,700	52	99.52	4
York	70,725,900	10	143,682,000	13	1,615,000	26	67.70	53
State	$2,852,686,300		$6,801,966,000		$452,753,600		79.14	

TABLE II—MANUFACTURING AND EXTRACTIVE INDUSTRY—1940 (Continued)

County	(9) Value of Product Per Dollar Invested	Rank	(10) Value of Product Per Dollar Compensation	Rank	(11) Value of Product Per Employee	Rank	(12) Capital Invested Per Employee	Rank	(13) Compensation Per Employee	Rank	(14) Wages Per Wage Earner	Rank
dams	$1.99	24	$3.38	31	$2,341	60	$1,177	63	$692	64	$606	64
llegheny	1.30	50	3.87	19	6,350	9	4,872	3	1,639	3	1,476	5
rmstrong	1.43	47	3.25	34	4,463	22	3,120	17	1,373	18	1,302	15
eaver	1.43	46	3.93	17	6,909	6	4,826	4	1,755	1	1,743	1
edford	.71	65	2.30	56	2,450	59	3,450	14	1,064	50	1,033	39
erks	1.83	30	2.87	46	3,273	42	1,785	48	1,141	38	1,013	43
lair	1.64	36	2.84	48	4,326	25	2,642	26	1,518	7	1,462	6
radford	2.31	10	4.02	14	5,493	11	2,370	34	1,364	19	1,273	17
ucks	1.99	23	3.61	27	4,286	27	2,151	39	1,184	33	1,023	42
utler	1.27	52	4.35	8	6,378	8	5,027	2	1,465	11	1,368	11
ambria	1.12	57	2.72	49	3,770	36	3,377	16	1,383	17	1,311	14
ameron	2.62	6	2.51	54	2,760	48	1,053	64	1,099	44	963	51
arbon	2.13	21	2.22	58	2,776	47	1,282	62	1,246	28	1,150	27
entre	1.48	43	2.90	44	3,114	44	2,110	41	1,072	48	982	47
hester	2.17	19	3.82	20	4,864	16	2,241	37	1,271	26	1,118	29
larion	1.93	26	2.90	45	3,217	43	1,666	50	1,108	43	1,032	40
learfield	1.16	56	2.19	59	2,261	62	1,945	44	1,028	54	967	50
linton	1.32	49	4.25	10	4,767	19	3,624	9	1,120	41	1,053	35
olumbia	2.24	13	4.40	7	4,397	24	1,963	42	998	57	897	57
rawford	1.50	41	3.20	35	4,619	21	3,069	19	1,439	12	1,313	13
umberland	2.87	3	3.62	26	3,832	34	1,335	61	1,056	52	970	49
auphin	2.21	16	4.19	11	5,342	15	2,422	31	1,273	25	1,157	25
elaware	1.66	35	4.45	5	7,681	2	4,638	5	1,725	2	1,573	2
lk	1.16	57	3.11	37	4,134	29	3,570	11	1,327	23	1,179	23
rie	2.29	11	3.56	29	5,447	14	2,378	33	1,526	6	1,371	10
ayette	1.50	42	1.88	63	2,658	53	1,776	49	1,413	15	1,355	12
orest	2.63	5	5.48	3	6,949	5	2,641	27	1,267	27	1,166	24
ranklin	2.17	17	3.32	33	3,916	33	1,803	46	1,176	35	1,024	41
ulton	1.08	58	1.50	67	1,684	66	1,556	57	1,118	42	1,108	31
reene	.40	67	1.71	66	2,655	54	6,691	1	1,545	5	1,515	3
luntingdon	1.44	45	2.19	60	2,226	63	1,549	58	1,014	56	933	56
ndiana	.67	66	1.80	65	2,302	61	3,425	15	1,275	24	1,218	20
efferson	1.08	59	2.16	61	2,564	55	2,385	32	1,182	34	1,122	28
uniata	1.51	40	2.05	62	1,331	67	882	67	647	65	601	65
ackawanna	.88	64	2.25	57	2,704	51	3,090	18	1,200	30	1,100	32
ancaster	2.40	8	3.72	22	3,943	32	1,641	53	1,056	51	936	55
awrence	1,57	38	3.10	38	4,701	20	3,995	20	1,514	8	1,385	9
ebanon	1.67	34	3.46	30	3,799	35	2,271	36	1,096	45	998	46
ehigh	2.43	7	3.66	24	4,001	31	1,646	52	1,092	46	940	54
uzerne	.96	63	2.37	55	2,732	49	2,846	23	1,148	37	1,081	34
ycoming	2.25	12	3.58	28	4,154	45	1,849	36	1,157	36	1,034	38
lcKean	1.46	44	4.41	6	5,464	13	3,739	8	1,236	29	1,012	45
lercer	1.87	27	4.33	9	7,048	4	3,760	7	1,626	4	1,508	4
lifflin	.97	62	2.51	53	3,370	41	3,477	13	1,339	20	1,273	18
lonroe	2.17	20	2.86	47	3,387	40	1,565	56	1,185	32	1,052	37
lontgomery	2.10	22	3.63	25	4,828	17	2,289	35	1,328	22	1,155	26
lontour	1.08	60	3.10	39	2,694	52	2,489	52	868	60	783	59
orthampton	1.54	39	3.32	32	4,424	23	2,880	21	1,328	21	1,215	21
orthumberland	1.24	53	2.64	50	2,719	50	2,198	38	1,027	55	978	48
erry	1.85	29	3.09	40	2,542	57	1,373	60	820	63	776	60
hiladelphia	2.17	18	3.92	18	5,489	12	2,528	29	1,400	16	1,191	22
ike	1.60	37	2.95	42	2,553	56	1,596	55	862	61	767	61
otter	1.22	54	4.11	13	3,507	37	2,878	22	851	62	733	63
chuylkill	1.38	48	2.57	51	2,928	46	2,129	40	1,136	39	1,084	33
nyder	1.85	28	2.97	41	1,883	65	1,017	66	633	66	576	66
omerset	1.71	32	1.86	64	1,990	64	1,635	54	1,064	49	1,012	44
ullivan	1.29	51	4.02	15	2,521	58	1,958	43	626	67	405	67
usquehanna	1.17	55	2.55	52	3,025	45	2,578	28	1,185	31	1,116	30
ioga	4.07	1	5.94	2	6,699	7	1,647	51	1,126	40	1,052	36
nion	2.40	9	3.78	21	3,393	39	1,414	59	896	58	817	58
enango	2.22	15	5.46	4	7,819	1	3,526	12	1,430	14	1,295	16
arren	1.67	33	4.18	12	5,988	10	3,579	10	1,413	13	1,264	19
ashington	1.03	61	2.90	43	4,323	26	4,194	6	1,486	10	1,430	7
ayne	3.40	2	3.98	16	3,479	38	1,022	65	872	59	745	62
estmoreland	1.81	31	3.20	36	4,821	18	2,667	25	1,502	9	1,401	8
yoming	2.66	4	6.95	1	7,166	3	2,695	24	1,030	53	942	53
ork	2.23	14	3.71	23	4,005	30	1,792	47	1,079	47	947	52
State	$1.61		$3.51		$4,793		$2,976		$1,367		$1,229	

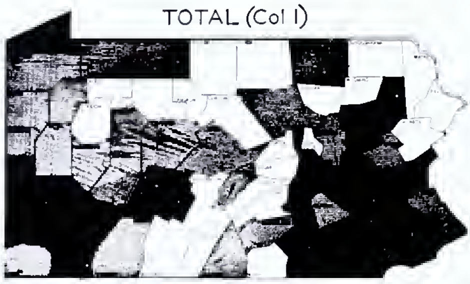
For sources of data see inside back cover.

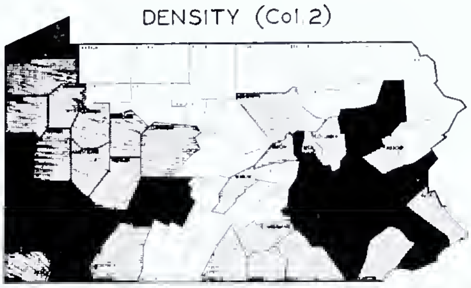
TABLE III—TRADE: WHOLESALE, RETAIL AND SERVICE—1939

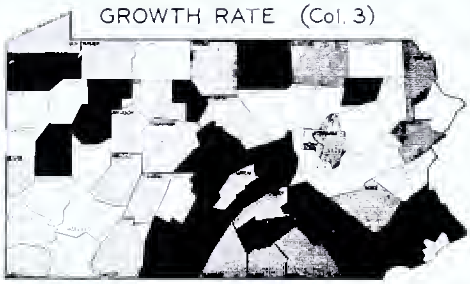
County	(1-USC) Stores and Service Shops	Rank	(2-USC) Sales: Wholesale, Retail and Service (Thousands)	Rank	(3-USC) Active Proprietors	Rank	(4-USC) Employees	Rank	(5-USC) Total Payroll (Thousands)	Rank	(6-USC) Retail and Service Sales Per Capita	Rank
Adams	622	50	$9,934	51	639	48	912	49	$664	50	$198.83	58
Allegheny	23,495	2	1,451,066	2	21,652	2	95,999	2	122,092	2	398.49	4
Armstrong	1,115	36	22,652	37	1,049	36	1,984	38	1,685	38	217.53	52
Beaver	2,432	22	60,617	20	2,377	18	5,018	20	4,431	21	281.94	31
Bedford	672	46	11,069	49	703	45	915	48	648	51	203.55	56
Berks	6,241	4	132,931	7	5,875	4	12,687	5	12,852	7	361.92	9
Blair	2,438	21	69,489	18	2,250	22	7,008	16	6,325	16	326.57	16
Bradford	1,014	38	18,120	40	992	38	1,379	44	1,163	44	307.39	22
Bucks	2,061	23	31,692	27	2,073	23	2,637	31	2,421	28	256.25	39
Butler	1,372	29	37,245	26	1,384	28	3,104	26	2,924	26	296.38	25
Cambria	2,936	17	88,112	15	2,690	17	8,466	13	7,914	14	292.46	26
Cameron	132	66	2,373	63	121	66	216	63	181	61	302.39	23
Carbon	1,184	33	15,645	43	1,145	33	1,325	45	1,073	45	203.52	57
Centre	877	42	21,633	39	861	41	2,085	35	1,786	36	298.68	24
Chester	2,442	20	54,432	21	2,333	20	4,903	21	4,521	20	323.92	17
Clarion	579	52	10,128	50	620	50	725	53	610	54	231.76	47
Clearfield	1,364	30	27,027	32	1,221	31	2,457	32	2,106	33	216.31	54
Clinton	654	47	11,985	46	631	49	1,185	46	987	46	268.88	35
Columbia	912	40	15,575	44	845	42	1,642	41	1,328	41	241.53	45
Crawford	1,274	31	26,627	33	1,280	30	2,638	30	2,412	30	318.24	20
Cumberland	1,376	28	27,590	31	1,304	29	2,720	28	2,414	29	289.99	28
Dauphin	3,827	12	127,903	8	3,458	13	12,500	7	13,542	6	405.36	3
Delaware	4,630	9	114,112	9	4,318	9	11,755	8	11,946	8	310.34	21
Elk	538	55	9,880	52	518	55	851	51	779	48	228.02	49
Erie	3,780	13	95,579	12	3,666	12	9,232	12	9,436	11	367.39	8
Fayette	2,518	18	65,317	19	2,278	21	6,549	19	5,824	19	254.05	41
Forest	97	67	968*	67	93*	67	79*	67	58*	66	167.15	64
Franklin	1,177	34	26,136	34	1,143	34	2,419	33	1,919	34	264.43	37
Fulton	241	62	1,408	65	255	62	133	64	83	65	128.73	67
Greene	551	54	9,363	54	560	54	793	52	612	53	180.38	62
Huntingdon	686	45	11,638	47	620	50	982	47	816	47	217.37	53
Indiana	1,173	35	24,932	35	1,139	35	2,044	36	1,782	37	225.59	50
Jefferson	834	43	16,899	42	839	43	1,509	42	1,219	43	248.25	42
Juniata	329	61	3,047	62	350	60	288	61	181	61	184.28	61
Lackawanna	5,672	5	148,874	4	5,294	6	13,186	4	13,623	5	290.68	27
Lancaster	5,393	7	135,355	6	5,126	7	10,645	10	10,188	10	360.36	10
Lawrence	1,769	26	43,027	24	1,739	25	4,100	23	3,768	23	319.14	19
Lebanon	1,505	27	28,296	30	1,451	27	2,745	27	2,364	31	321.05	18
Lehigh	4,089	11	108,479	10	3,819	11	10,952	9	11,636	9	387.69	5
Luzerne	8,527	3	192,949	3	8,047	3	16,723	3	16,205	3	264.68	36
Lycoming	1,911	24	43,282	22	1,716	26	4,397	22	4,061	22	328.35	13
McKean	1,070	37	30,935	28	1,001	37	2,701	29	2,744	27	343.74	12
Mercer	1,897	25	43,065	23	1,922	24	4,098	24	3,645	24	327.14	15
Mifflin	885	41	17,041	41	878	40	1,719	40	1,433	40	289.65	29
Monroe	826	44	14,041	45	727	44	1,451	43	1,251	42	384.73	6
Montgomery	5,659	6	147,780	5	5,428	5	12,664	6	13,829	4	376.87	7
Montour	227	63	4,118	60	227	63	365	60	277	60	186.27	60
Northampton	3,525	14	95,176	13	3,279	15	8,200	15	8,739	12	347.09	11
Northumberland	2,451	19	42,227	25	2,362	19	3,810	25	3,310	25	245.98	43
Perry	432	57	5,239	59	441	57	483	57	336	58	177.83	63
Philadelphia	47,006	1	2,467,163	1	44,165	1	160,139	1	205,212	1	437.55	1
Pike	187	64	1,658*	64	191*	64	120*	65	103*	64	222.49	51
Potter	341	60	6,017	56	367	59	396	59	335	59	269.10	34
Schuylkill	4,973	8	77,333	17	4,741	8	6,985	17	6,031	18	236.85	46
Snyder	416	58	3,531	61	444	56	243	62	175	63	152.46	65
Somerset	1,224	32	22,646	38	1,174	32	2,038	37	1,540	39	229.51	48
Sullivan	167	65	1,112	66	173	65	94	66	58	66	138.32	66
Susquehanna	593	51	7,963	55	590	52	569	55	467	55	198.21	59
Tioga	645	48	11,583	48	657	46	875	50	699	49	244.22	44
Union	444	56	5,451	58	424	58	507	56	411	56	211.58	55
Venango	987	39	30,076	29	941	39	2,387	34	2,311	32	283.56	30
Warren	638	49	23,268	36	644	47	1,913	39	1,867	35	408.53	2
Washington	3,249	16	78,035	16	3,097	16	6,928	18	6,294	17	276.30	32
Wayne	577	53	9,773	53	575	53	678	54	626	52	254.59	40
Westmoreland	4,505	10	98,804	11	4,131	10	9,306	11	8,229	13	258.28	38
Wyoming	368	59	5,658	57	349	61	400	58	365	57	273.73	33
York	3,411	15	90,807	14	3,295	14	8,358	14	7,821	15	328.10	14
State	191,142		$6,693,965*		180,609*		509,321*		$568,688*		$338.02	
Wholesale	11,450		3,347,488*		8,671*		98,972*		169,140*			
Retail	134,543		3,133,377		125,532		348,390		338,718			
Service	45,149		213,100		46,496		61,959		60,830			

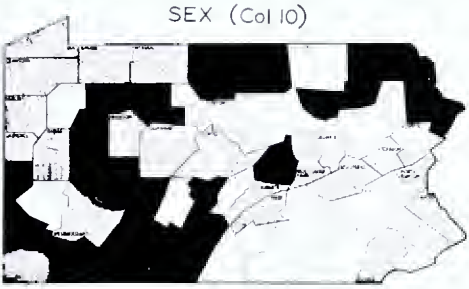
* Wholesale data not included for Forest County (1 establishment), or Pike County (2 establishments).
For sources of data see inside back cover.

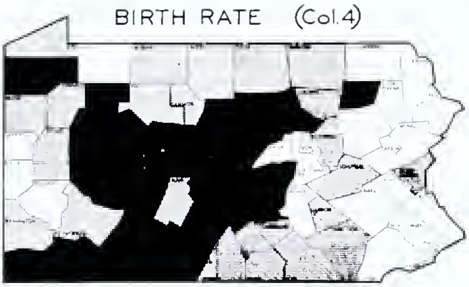
POPULATION, 1940 TABLE I

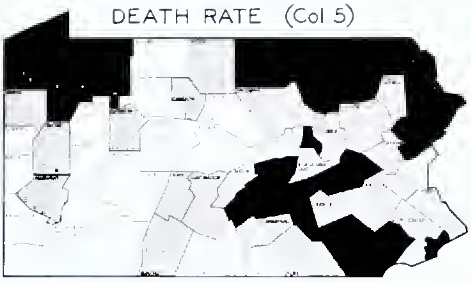

TOTAL (Col I)

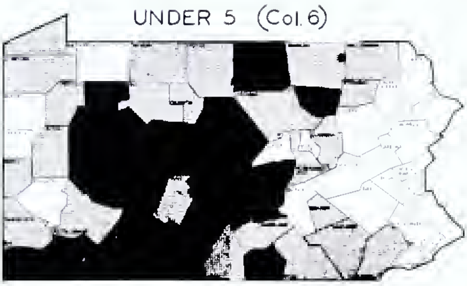

DENSITY (Col. 2)

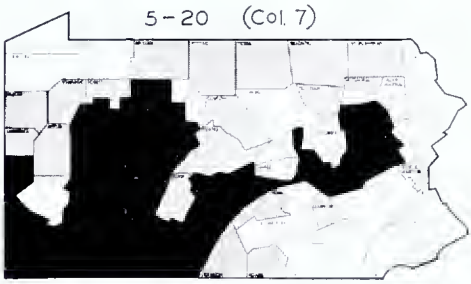

GROWTH RATE (Col. 3)

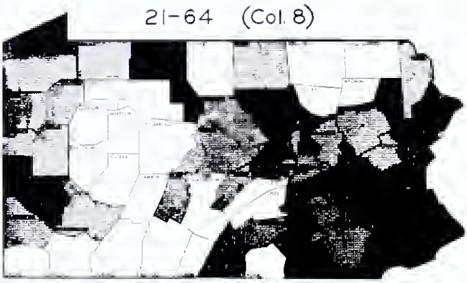

SEX (Col IO)

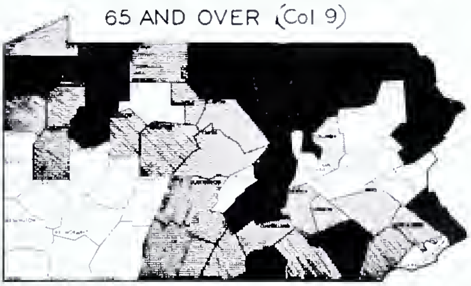

BIRTH RATE (Col. 4)


DEATH RATE (Col 5)


UNDER 5 (Col. 6)


5-20 (Col. 7)


21-64 (Col. 8)

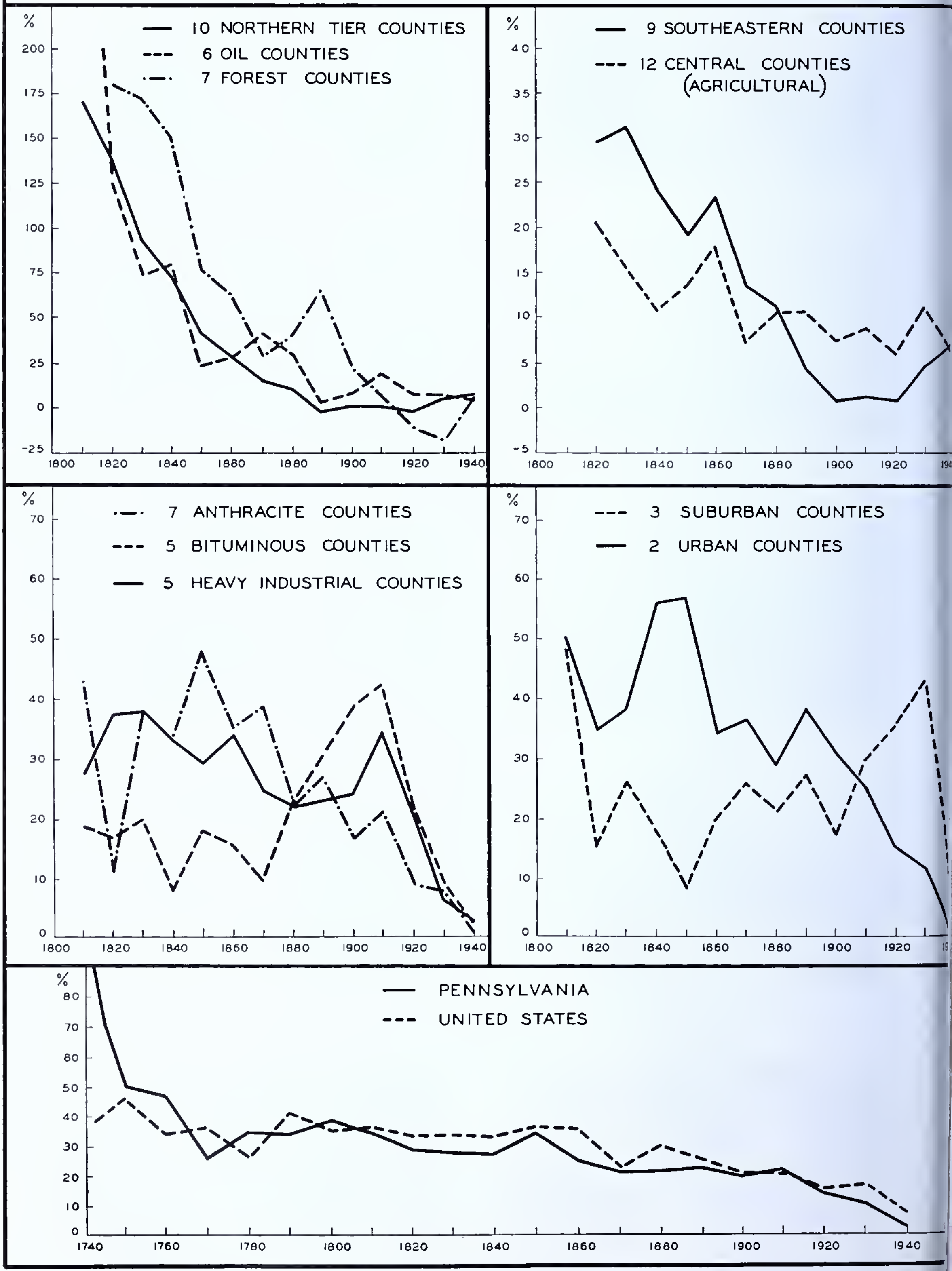

65 AND OVER (Col 9)

PENNSYLVANIA STATE PLANNING BOARD

or explanation of map legend see inside back cover.

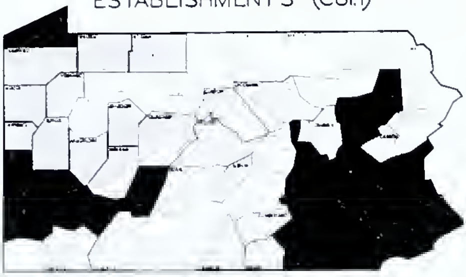
POPULATION GROWTH RATES

PENNSYLVANIA STATE PLANNING BOARD

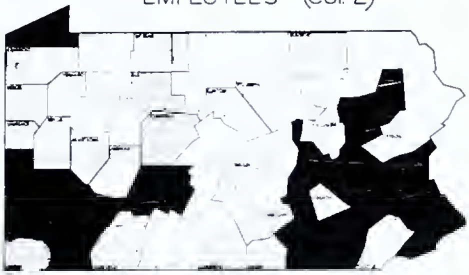


MANUFACTURING, 1940 TABLE II

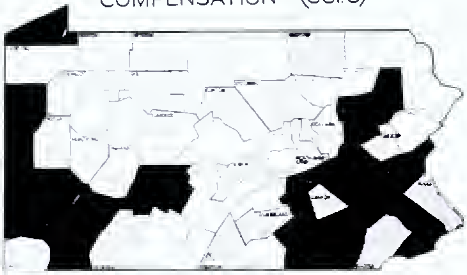
ESTABLISHMENTS (Col. 1)



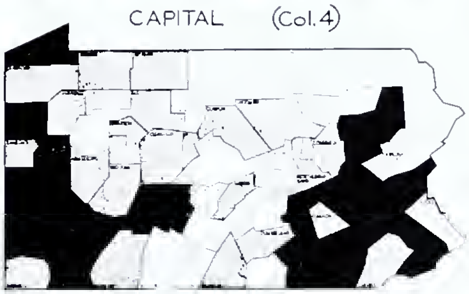
EMPLOYEES (Col. 2)



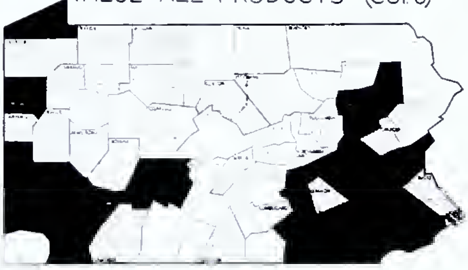
COMPENSATION (Col. 3)



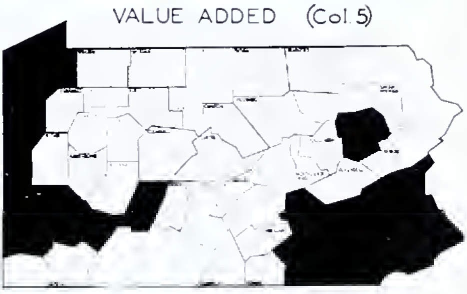
CAPITAL (Col. 4)



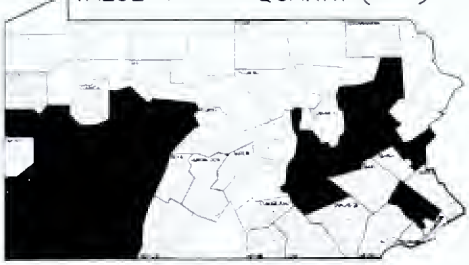
VALUE ALL PRODUCTS (Col. 6)



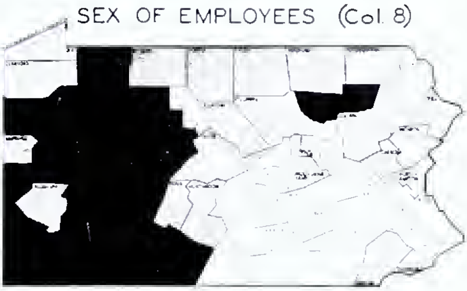
VALUE ADDED (Col. 5)



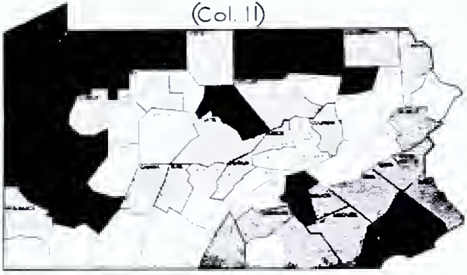
VALUE MINE & QUARRY (Col. 7)



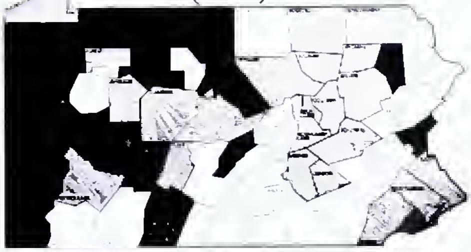
SEX OF EMPLOYEES (Col. 8)



VALUE PER EMPLOYEE (Col. 11)



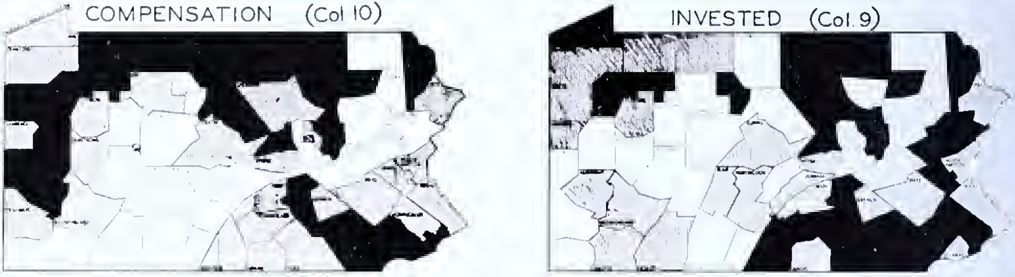
CAPITAL PER EMPLOYEE (Col. 12)



PENNSYLVANIA STATE PLANNING BOARD

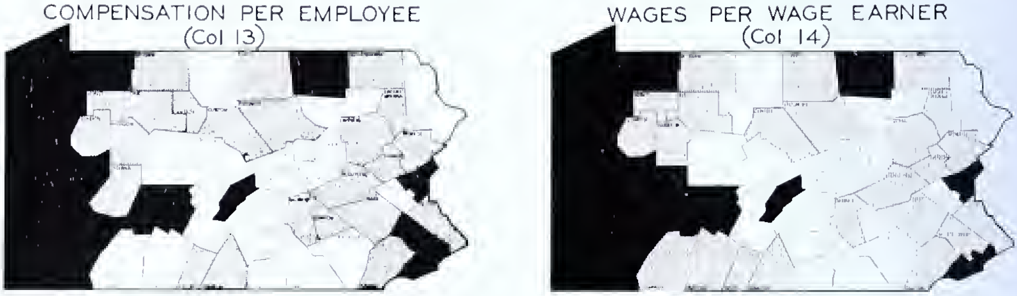
For explanation of map legend see inside back cover.

MANUFACTURING, 1940 TABLE II



VALUE PRODUCT PER DOLLAR COMPENSATION (Col 10)

VALUE PRODUCT PER DOLLAR INVESTED (Col. 9)

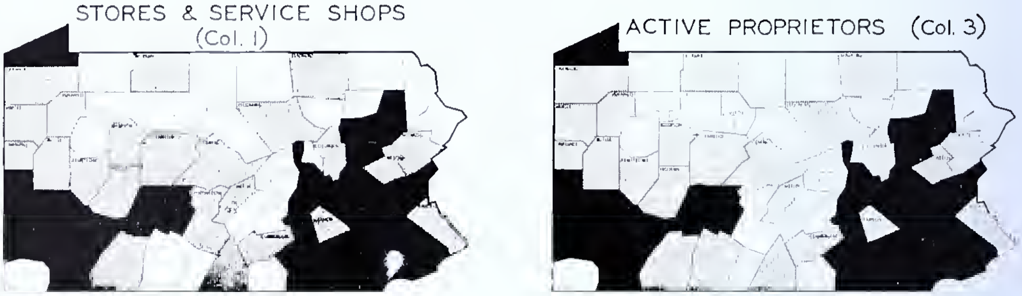


COMPENSATION PER EMPLOYEE (Col 13)

WAGES PER WAGE EARNER (Col 14)

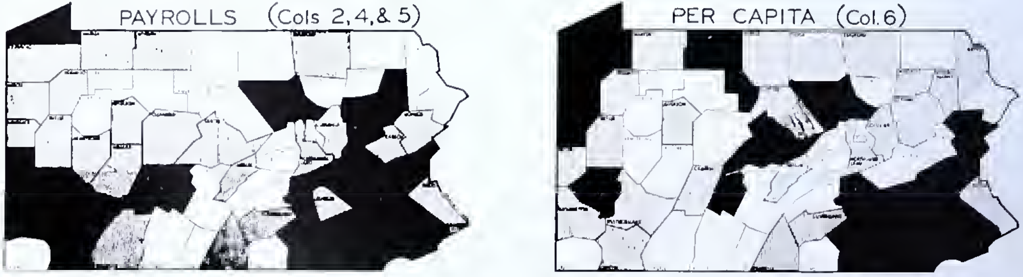
PENNSYLVANIA STATE PLANNING BOARD

WHOLESALE, RETAIL, & SERVICE, 1939 TABLE III



STORES & SERVICE SHOPS (Col. 1)

ACTIVE PROPRIETORS (Col. 3)



SALES & RECEIPTS EMPLOYEES PAYROLLS (Cols 2,4,& 5)

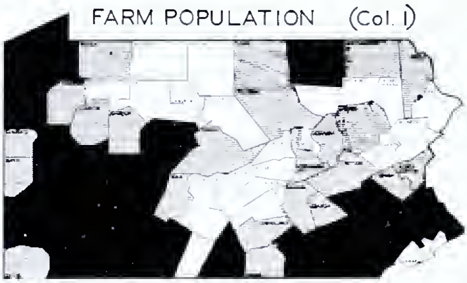
RETAIL & SERVICE SALES PER CAPITA (Col. 6)

PENNSYLVANIA STATE PLANNING BOARD

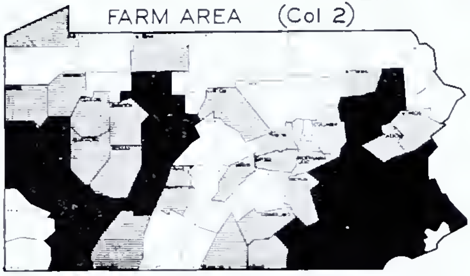
For explanation of map legend see inside back cover.

AGRICULTURE, 1940 TABLE IV

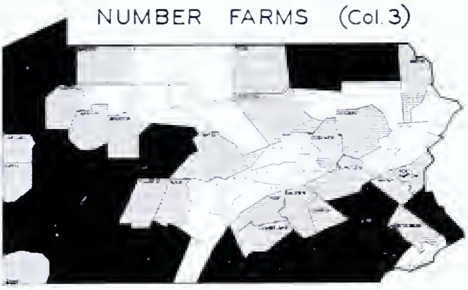
FARM POPULATION (Col. 1)



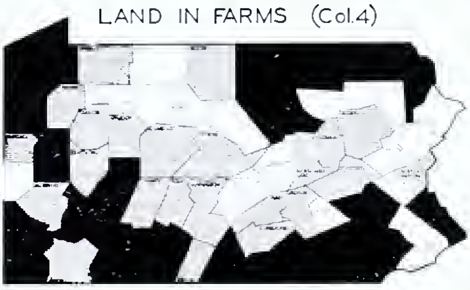
FARM POPULATION PER FARM AREA (Col 2)



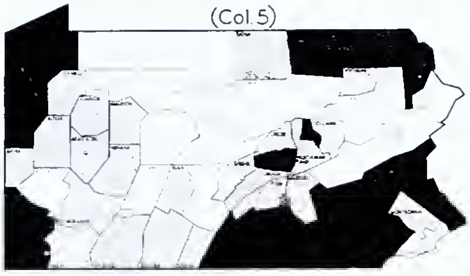
NUMBER FARMS (Col. 3)



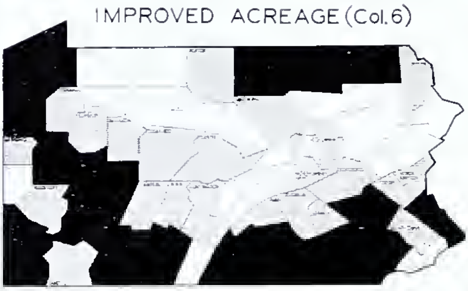
LAND IN FARMS (Col. 4)



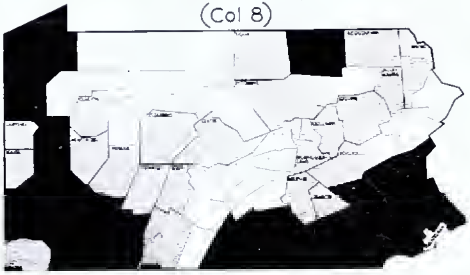
PERCENT AREA IN FARMS (Col. 5)



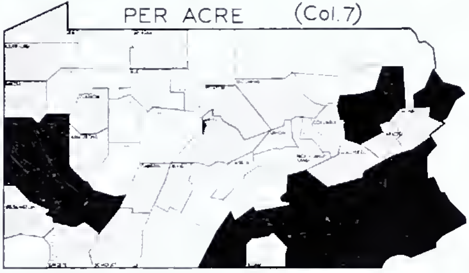
IMPROVED ACREAGE (Col. 6)



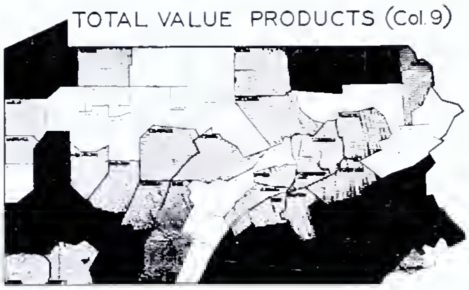
VALUE FARM & EQUIPMENT (Col 8)



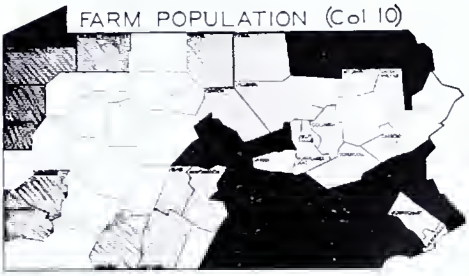
VALUE FARM & BUILDINGS PER ACRE (Col. 7)



TOTAL VALUE PRODUCTS (Col. 9)



VALUE PRODUCTS PER FARM POPULATION (Col 10)

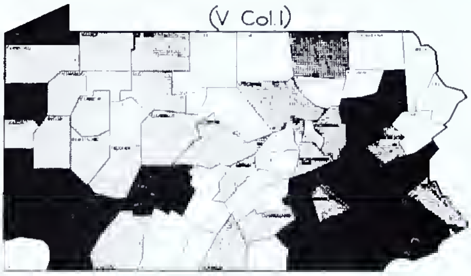


PENNSYLVANIA STATE PLANNING BOARD

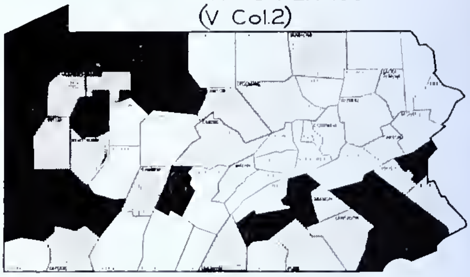
For explanation of map legend see inside back cover.

WEALTH, TABLE V, AND FACILITIES, TABLE VI

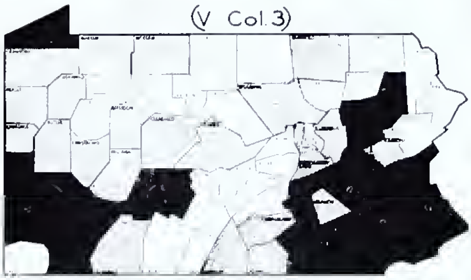
INCOME TAX RETURNS 1941
(V Col.1)



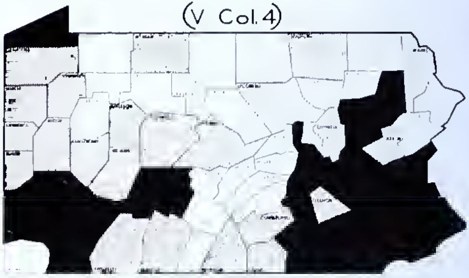
TAX RETURNS PER 100
(V Col.2)



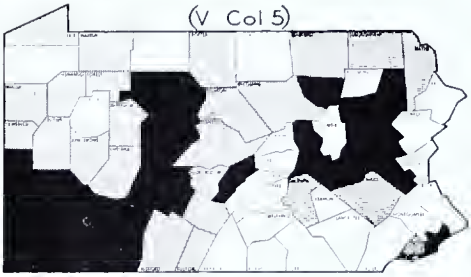
PASSENGER CARS 1940
(V Col.3)



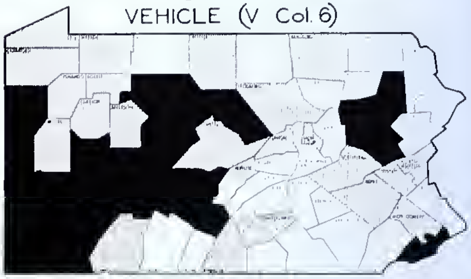
COMMERCIAL VEHICLES
(V Col.4)



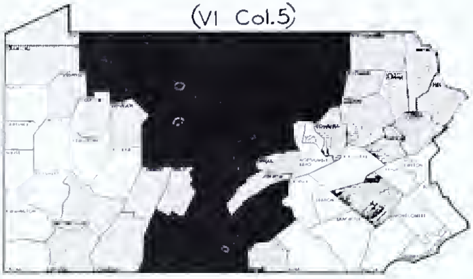
POPULATION PER CAR
(V Col.5)



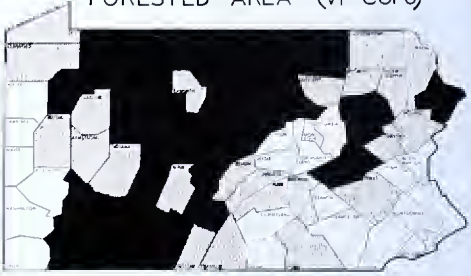
POPULATION PER COMMERCIAL VEHICLE (V Col.6)



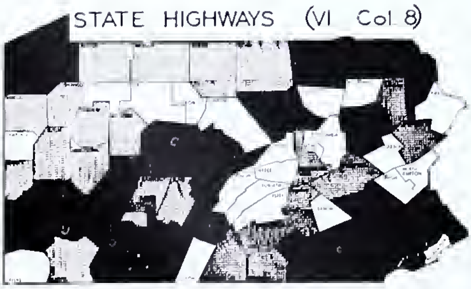
PUBLIC FORESTS & PARKS
(VI Col.5)



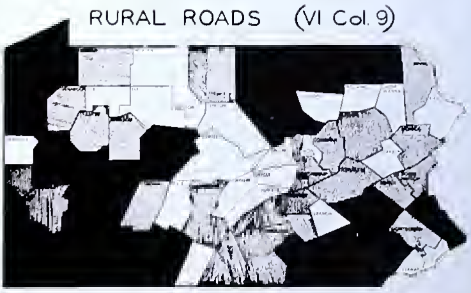
FORESTED AREA (VI Col 6)



STATE HIGHWAYS (VI Col 8)



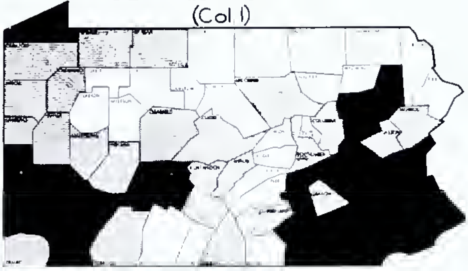
RURAL ROADS (VI Col 9)

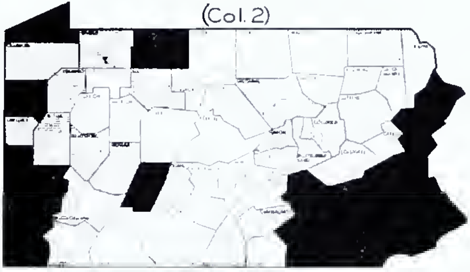


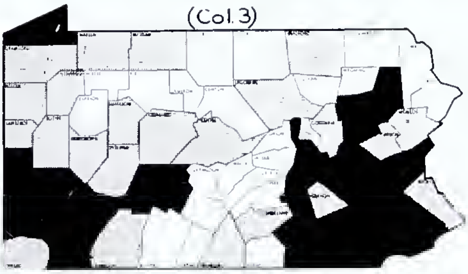
PENNSYLVANIA STATE PLANNING BOARD

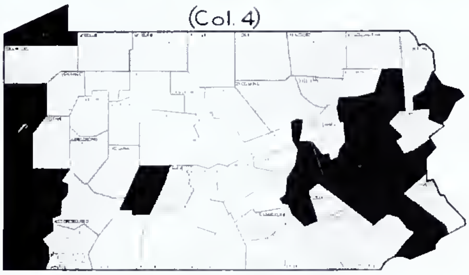
For explanation of map legend see inside back cover.

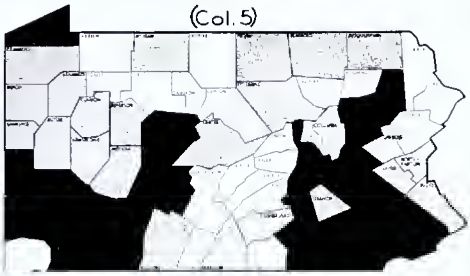
PUBLIC FINANCE, TABLE VII

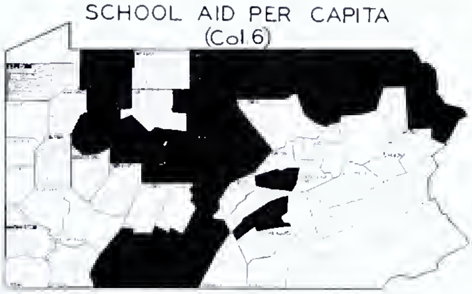

TRUE VALUATION 1939-40
(Col. 1)

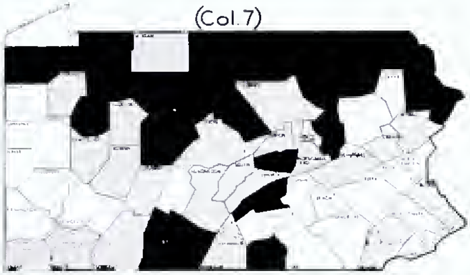

TRUE VALUATION PER CAPITA
(Col. 2)

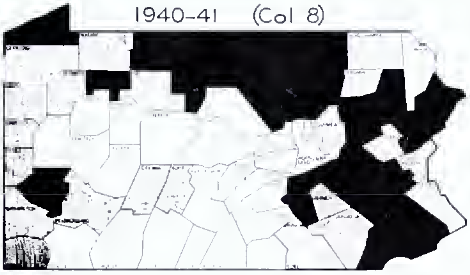

LOCAL TAXES 1939
(Col. 3)

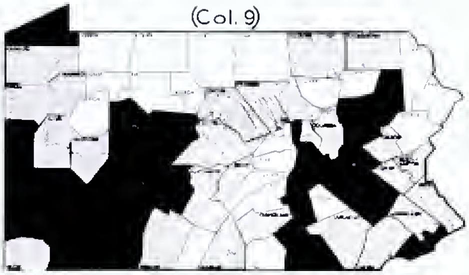

LOCAL TAXES PER CAPITA
(Col. 4)

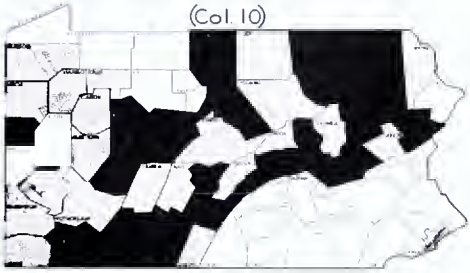

STATE AID TO SCHOOLS 1940-41
(Col. 5)


SCHOOL AID PER CAPITA
(Col. 6)


SCHOOL AID PER PUPIL
(Col. 7)

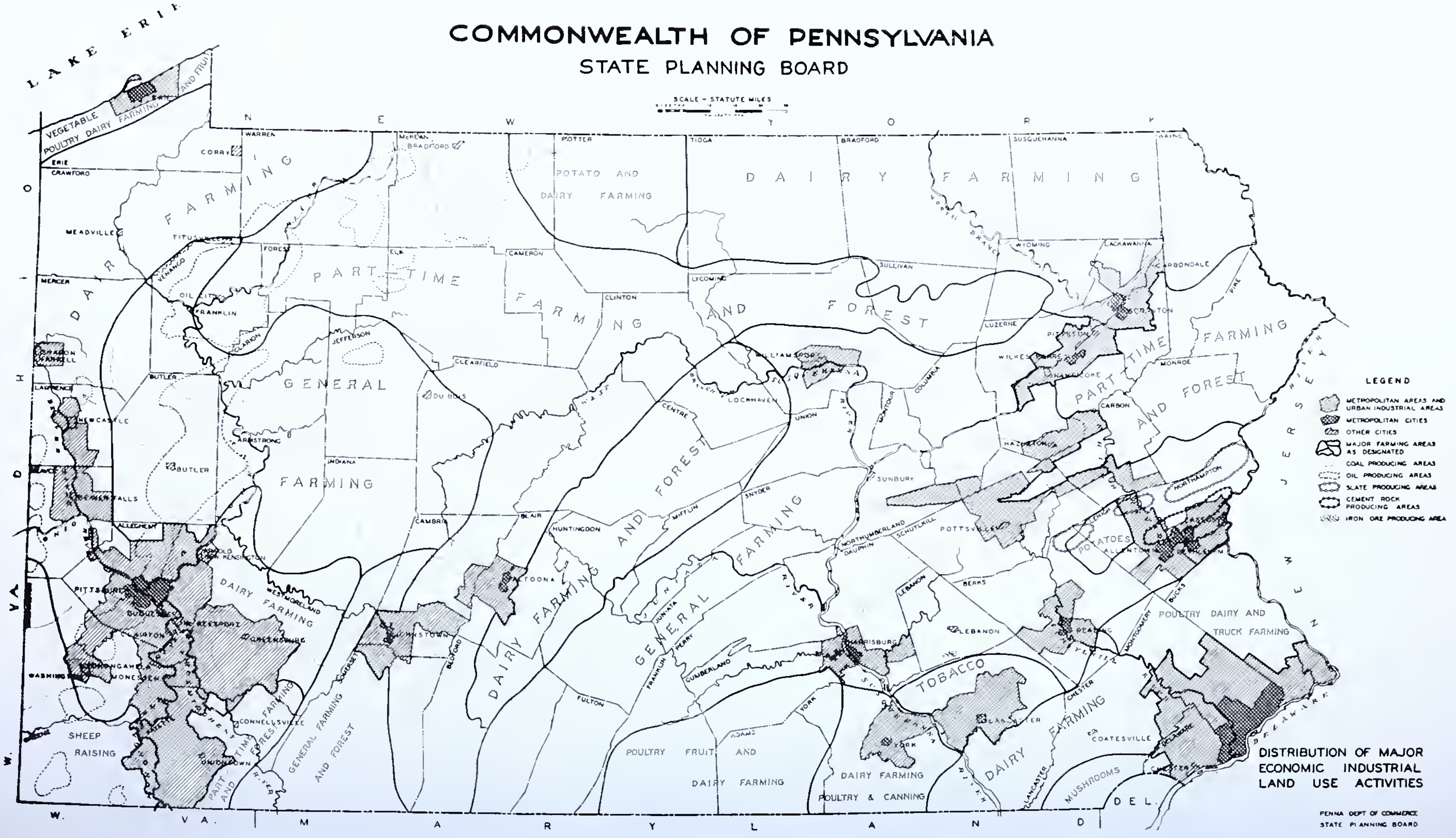

SCHOOL COST PER PUPIL
1940-41 (Col. 8)


PERSONS ON RELIEF 1941
(Col. 9)


PERCENT ON RELIEF 1941
(Col. 10)

PENNSYLVANIA STATE PLANNING BOARD

For explanation of map legend see inside back cover.



COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

DISTRIBUTION OF MAJOR ECONOMIC INDUSTRIAL LAND USE ACTIVITIES

PENNA DEPT OF COMMERCE
STATE PLANNING BOARD

TABLE IV—AGRICULTURE

County	(1-USC) Farm Population, 1940	Rank	(2-USC) Farm Population Per Square Mile of Farm Land, 1940	Rank	(3-USC) Total Number of Farms, 1940	Rank	(4-USC) Land in Farms (Acres) 1940	Rank	(5-USC) Per Cent of Total Area in Farms, 1940	Rank	(6-USC) Improved Acreage (Acres) 1939	Rank
dams	14,772	23	37	37	3,071	18	255,460	22	75.9	6	185,649	21
llegheny	19,222	17	129	1	3,004	21	159,115	41	34.1	51	114,991	37
rmstrong	16,735	20	44	25	3,047	20	245,740	23	58.2	28	174,318	22
eaver	12,404	35	55	9	2,047	39	144,178	50	51.1	38	86,540	49
dford	15,359	22	26	57	2,944	22	373,566	10	57.3	29	189,445	19
rks	31,477	3	52	11	5,541	4	389,646	8	70.5	13	292,071	5
lair	9,976	43	41	27	1,931	43	154,645	44	45.6	41	97,511	44
radford	19,927	13	24	62	4,269	10	535,316	1	72.9	11	300,100	4
ucks	24,727	6	62	4	4,299	8	256,846	21	65.0	21	198,144	17
utler	23,907	8	48	20	4,528	5	317,287	17	62.4	24	201,803	15
ambria	15,631	21	57	8	2,719	27	175,194	38	39.4	48	106,298	42
ameron	547	66	23	63	165	67	15,330	66	6.0	67	4,779	67
arbon	3,811	61	44	23	674	61	55,361	61	21.4	60	32,463	60
entre	11,945	38	32	48	1,977	42	239,481	25	33.6	53	148,368	24
hester	30,432	4	53	10	4,290	9	367,743	11	75.6	8	267,975	7
larion	12,782	31	38	32	2,199	34	214,695	28	56.0	32	131,996	27
learfield	18,961	18	57	6	3,530	15	211,441	30	28.9	56	124,449	31
linton	4,206	59	33	43	762	59	80,389	58	13.9	62	46,554	58
olumbia	10,758	42	38	33	2,099	36	180,898	35	58.4	27	119,821	34
rawford	24,488	7	32	47	5,596	3	486,024	3	74.7	9	278,290	6
umberland	13,793	27	38	31	2,809	25	231,609	26	65.2	20	190,914	18
auphin	11,878	39	43	26	2,098	37	176,392	36	53.0	36	133,929	26
elaware	6,635	54	88	2	825	58	48,375	63	40.9	47	31,737	52
lk	3,831	60	44	22	720	60	55,213	62	10.7	66	28,842	61
rie	20,427	10	36	40	4,503	6	366,460	12	70.5	12	203,700	13
ayette	18,197	19	51	12	3,053	19	227,024	27	44.3	42	140,010	25
orest	1,424	65	29	54	276	65	31,334	65	11.7	65	13,718	64
ranklin	19,421	14	37	38	3,731	13	336,353	13	69.7	14	246,337	9
ulton	7,159	51	26	58	1,417	52	175,394	37	63.0	23	86,730	48
reene	13,871	26	29	55	2,650	29	310,925	19	84.2	1	248,304	8
untingdon	9,076	47	24	61	1,625	48	240,041	24	41.9	46	125,201	29
diana	19,340	16	40	29	3,235	16	312,469	18	58.8	25	201,250	16
fferson	13,042	30	44	24	2,356	32	190,557	33	45.7	40	121,810	33
niata	6,998	52	31	50	1,501	50	145,311	49	58.7	26	82,715	51
ackawanna	8,485	48	49	18	1,510	49	109,957	55	37.8	49	47,226	57
ancaster	46,129	1	58	5	8,446	1	507,217	2	83.9	2	418,903	1
awrence	12,038	36	50	17	2,155	35	154,489	45	65.8	17	114,070	38
banon	11,796	40	50	15	1,920	44	149,465	48	64.3	22	127,635	28
high	11,986	37	50	16	2,074	38	152,385	46	68.6	15	118,251	35
uzerne	12,764	32	51	14	2,386	31	161,145	40	28.3	57	86,216	50
ycoming	12,671	33	29	52	2,718	28	275,631	20	35.4	50	160,100	23
cKean	6,206	56	35	41	1,234	54	112,109	54	17.6	61	47,955	56
ercer	19,365	15	39	30	3,764	12	319,363	16	73.3	10	186,062	20
ifflin	6,102	57	33	44	1,147	56	118,111	53	42.8	45	73,940	52
onroe	6,450	55	41	28	1,183	55	100,019	56	25.6	59	53,090	55
ontgomery	20,160	11	86	3	2,951	23	149,540	47	48.3	39	122,295	32
ontour	3,408	62	33	46	637	63	66,650	60	80.1	3	46,390	59
orthampton	14,045	25	57	7	2,597	30	156,949	42	65.6	19	125,180	30
orthumberland	9,615	44	38	34	1,812	46	163,220	39	56.2	31	111,856	39
erry	9,105	46	29	53	1,885	45	200,412	31	56.9	30	111,209	40
hiladelphia	—	*	—	*	239	66	10,660	67	12.3	64	8,560	66
ike	2,002	64	28	56	465	64	46,392	64	13.3	63	9,480	65
otter	6,652	53	20	66	1,420	51	212,515	29	30.4	55	94,796	45
chuylkill	12,411	34	51	13	2,032	40	156,191	43	31.2	54	101,429	43
nyder	8,058	49	37	35	1,667	47	138,097	51	65.6	18	92,449	46
omerset	20,034	12	33	45	3,627	14	388,464	9	56.0	33	216,077	12
ullivan	3,157	63	26	60	651	62	79,049	59	25.8	58	28,744	63
usquehanna	14,548	24	23	64	3,227	17	413,552	6	77.3	5	219,243	11
ioga	13,609	28	22	65	2,783	26	392,698	7	53.4	35	202,380	14
nion	5,026	58	36	39	1,044	57	88,206	57	43.3	43	68,416	54
enango	10,834	41	37	36	2,294	33	186,881	34	43.3	44	106,932	41
arren	9,231	45	30	51	2,028	41	196,823	32	33.8	52	91,106	47
ashington	20,682	9	32	49	4,366	7	415,318	5	75.7	7	334,352	3
ayne	13,116	29	26	59	2,834	24	326,457	15	68.6	16	117,941	36
estmoreland	25,027	5	48	21	3,930	11	335,577	14	51.2	37	228,687	10
yoming	7,500	50	35	42	1,340	53	136,732	52	54.0	34	72,461	53
ork	35,797	2	49	19	7,120	2	468,048	4	80.0	4	339,881	2
State	905,168		40		169,027		14,504,134		50.6		9,240,159	

* Philadelphia County not ranked, due to insufficient data. For sources of data see inside back cover.

TABLE IV—AGRICULTURE (Continued)

County	(7-USC) Value of Farm Land and Buildings Per Acre, 1940	Rank	(8-USC) Total Value of Farm Land, Buildings, Implements and Machinery, 1940	Rank	(9-USC) Value of Farm Products Sold, Traded, or Used on Farms, 1940	Rank	(10-USC) Value of Farm Products Per Capita Farm Population, 1940	Rank
Adams	$50.90	29	$15,580,769	21	$4,289,543	17	$290	17
Allegheny	203.80	4	34,308,529	6	4,107,412	19	214	40
Armstrong	43.04	37	12,082,131	31	2,202,470	38	132	63
Beaver	67.74	14	10,720,664	36	1,576,231	53	127	65
Bedford	25.13	61	11,199,119	34	3,258,586	28	212	41
Berks	70.18	12	32,775,003	7	9,301,525	5	296	16
Blair	53.05	26	9,576,949	41	2,549,638	34	256	28
Bradford	26.28	60	17,435,542	18	5,994,962	7	301	12
Bucks	146.38	6	42,526,812	3	9,560,252	4	387	3
Butler	65.76	17	23,632,834	10	4,435,520	15	186	49
Cambria	47.21	32	9,628,493	40	2,101,426	40	134	61
Cameron	24.36	64	427,302	67	87,901	67	161	51
Carbon	54.47	25	3,484,429	61	884,569	61	232	33
Centre	41.45	39	12,076,004	32	3,292,721	27	276	22
Chester	155.73	5	62,626,093	2	12,917,756	2	424	2
Clarion	38.89	43	9,952,013	38	1,843,291	48	144	58
Clearfield	37.18	48	9,209,779	44	1,936,985	45	102	66
Clinton	38.85	44	3,778,736	60	957,247	60	228	34
Columbia	43.68	36	9,657,570	39	2,850,492	30	265	26
Crawford	38.51	45	21,964,513	14	5,087,083	10	208	42
Cumberland	66.39	16	17,665,393	17	4,143,387	18	300	13
Dauphin	59.03	21	12,153,966	29	3,350,471	25	282	20
Delaware	451.14	2	22,516,264	11	2,189,946	39	330	5
Elk	43.01	38	2,750,307	65	536,903	64	140	60
Erie	51.05	28	22,025,021	13	5,860,202	8	287	19
Fayette	54.82	23	14,153,642	22	2,323,567	37	128	64
Forest	22.99	66	816,219	66	187,961	66	132	62
Franklin	57.45	22	22,245,682	12	6,194,522	6	319	8
Fulton	23.01	65	4,857,960	59	1,237,474	56	173	50
Greene	35.61	53	12,111,661	30	2,051,591	42	148	56
Huntingdon	24.36	63	6,948,927	50	1,828,425	49	201	45
Indiana	36.63	50	13,480,739	26	3,001,117	29	155	53
Jefferson	35.92	52	8,180,870	46	1,906,147	47	146	57
Juniata	34.32	54	6,135,669	53	2,082,027	41	298	14
Lackawanna	77.02	11	9,358,163	43	1,928,956	46	227	35
Lancaster	142.16	7	81,905,951	1	24,548,638	1	532	1
Lawrence	61.68	19	10,960,938	35	2,478,185	36	206	43
Lebanon	77.81	10	13,719,612	24	3,996,064	21	339	4
Lehigh	89.96	9	16,453,797	20	3,940,211	22	329	6
Luzerne	66.44	15	12,255,160	28	2,510,132	35	197	47
Lycoming	40.59	41	13,330,586	27	3,320,910	26	262	27
McKean	40.51	42	5,153,729	58	991,934	58	160	52
Mercer	46.82	33	17,719,699	16	3,906,216	23	202	44
Mifflin	46.57	34	6,403,270	51	1,715,257	51	281	21
Monroe	54.66	24	6,213 830	52	984,245	59	153	55
Montgomery	219.60	3	35,839,327	5	5,511,761	9	273	24
Montour	38.41	46	3,249,426	62	829,935	62	244	29
Northampton	90.96	8	17,176,231	19	4,475,143	14	319	9
Northumberland	44.12	35	8,581,504	45	2,651,567	33	276	23
Perry	29.57	58	7,217,814	48	2,706,302	31	297	15
Philadelphia	934.07	1	10,202,379	37	1,013,629	57	—	*
Pike	60.38	20	2,987,343	63	308,773	65	154	54
Potter	22.74	67	5,795,637	55	1,592,484	52	239	31
Schuylkill	50.49	31	9,563,244	42	2,697,850	32	217	39
Snyder	31.69	55	5,359,804	57	1,949,647	44	242	30
Somerset	40.87	40	18,945,503	15	4,542,665	13	227	36
Sullivan	30.59	57	2,793,732	64	627,445	63	199	46
Susquehanna	27.66	59	13,612,918	25	4,382,182	16	301	11
Tioga	24.98	62	11,915,553	33	3,642,837	24	268	25
Union	50.74	30	5,406,028	56	1,458,450	55	290	18
Venango	36.15	51	7,679,787	47	1,525,029	54	141	59
Warren	30.85	56	7,149,055	49	2,050,229	43	222	37
Washington	52.02	27	24,292,889	9	4,581,629	12	222	38
Wayne	37.15	49	14,016,151	23	4,004,496	20	305	10
Westmoreland	64.62	18	24,708,881	8	4,676,238	11	187	48
Wyoming	37.91	47	6,114,576	54	1,765,880	50	235	32
York	70.13	13	38,531,267	4	11,643,263	3	325	7
State	$59.22		$993,298,988		$235,087,532		$260	

* Philadelphia County not ranked, due to insufficient data.

TABLE V—DISTRIBUTION OF WEALTH

County	(1-IR) Income Tax Returns, 1941	Rank	(2-IR) Income Tax Returns Per 100 of Population, 1941	Rank	(3-R) Passenger Cars Registered, 1940*	Rank	(4-R) Commercial Vehicles§ Registered, 1940*	Rank	(5-R) Population Per Passenger Car, 1940*	Rank	(6-R) Population Per Commercial Vehicle§ 1940*	Ra
A ms	1,921	52	4.87	60	11,110	43	1,729	42	3.55	63	22.8	53
A gheny	243,133	2	17.20	3	250,925	2	35,331	2	5.63	7	40.0	7
A strong	6,722	31	8.29	39	17,048	33	1,969	40	4.75	24	41.2	6
B ver	21,261	13	13.57	8	28,732	21	3,428	24	5.45	10	45.7	2
B ford	1,321	55	3.24	65	9,960	45	1,879	41	4.09	45	21.7	59
B ks	27,008	7	11.15	15	55,931	7	8,945	7	4.32	34	27.0	35
B ir	14,474	20	10.29	19	27,199	22	44,428	22	5.17	15	31.7	22
B dford	4,001	42	7.90	41	11,493	41	1,971	38	4.51	30	25.7	44
B ks	10,825	24	10.06	23	30,073	20	5,241	20	3.59	62	20.5	61
B ler	8,715	26	9.94	24	21,261	28	3,306	25	4.12	43	26.4	40
C nbria	20,904	14	9.82	25	35,627	16	5,126	21	5.99	5	41.7	4
C neron	1,205	56	17.60	2	1,340	66	182	67	5.11	18	37.6	12
C bon	5,960	34	9.66	29	11,493	41	1,547	44	5.37	11	39.9	8
C tre	4,154	41	7.91	40	12,642	40	1,971	38	4.17	41	26.7	37
C ster	13,971	21	10.28	20	33,520	18	5,975	15	4.04	47	22.7	55
C rion	4,638	29	12.04	12	9,960	45	1,456	48	3.86	55	26.4	41
C arfield	5,271	35	5.73	55	16,856	34	2,578	33	5.46	9	35.7	14
C ton	2,950	48	8.55	35	7,470	52	1.062	54	4.62	28	32.5	21
C umbia	3,601	45	7.02	44	13,025	39	2,609	31	3.94	49	19.7	62
C wford	7,589	29	10.17	21	19,346	29	2,487	34	3.70	58	28.8	30
C nberland	7,599	28	10.13	22	21,645	27	2,821	29	3.45	65	26.5	39
D phin	22,923	12	12.90	9	37,543	15	9,281	5	4.73	26	19.1	65
D aware	59,343	3	19.08	1	72.787	4	6,490	12	4.27	38	47.9	1
E	3,930	43	11.39	14	6,513	55	910	57	5.29	14	38.2	10
E	26,675	9	14.74	6	44,055	10	6,278	13	4.10	44	28.8	29
F ette	16,682	17	8.31	38	33,137	19	5,278	19	6.07	4	38.1	11
F est	395	65	6.82	45	1,340	66	212	66	4.32	36	27.3	33
F nklin	5,184	37	7.48	42	18,005	31	2,609	31	3.85	56	26.6	38
F ton	171	67	1.60	67	2,490	63	464	64	4.29	37	23.0	52
G ene	2,988	47	6.69	49	8,811	50	1,062	54	5.06	19	36.8	13
H tingdon	1,943	51	4.66	61	9,194	47	1,214	52	4.55	29	34.4	18
I iana	5,266	36	6.60	50	16,856	34	2,245	36	4.73	25	35.6	15
J ferson	3,107	46	5.74	54	11,493	38	1,729	42	4.71	27	31.2	23
J iata	616	63	4.02	64	4,214	61	607	61	3.65	61	25.3	46
L kawanna	26,766	8	8.89	32	42,523	11	8,575	9	7.08	2	35.1	17
L caster	19,530	15	9.21	30	54,016	8	9,099	6	3.94	50	23.4	49
L rence	11,070	23	11.83	13	22,411	23	2,881	27	4.32	35	33.6	20
L anon	6,639	32	9.13	31	18,388	30	2,942	26	3.95	48	24.7	47
L igh	17,262	16	9.74	28	34,670	17	6,248	14	5.12	17	28.4	31
L erne	37,301	5	8.45	36	68,190	5	13,072	3	6.48	3	33.8	19
L oming	9,147	25	9.76	27	22,411	23	3,457	23	4.17	40	27.1	34
M Kean	7,007	30	12.34	10	14,558	37	2,487	34	3.90	52	22.8	54
M cer	12,248	22	12.12	11	23,177	25	2,852	28	4.37	31	35.5	16
M flin	3,622	44	8.43	37	8,811	50	1,395	51	4.88	21	30.8	25
M nroe	2,557	49	8.57	34	9,003	48	1,517	46	3.31	66	19.6	63
M ntgomery	47,431	4	16.39	5	74,703	3	10,980	4	3.87	54	26.3	42
M ntour	705	61	4.56	62	3,065	62	576	62	5.14	16	26.8	36
N thampton	24,840	10	14.70	7	41,374	12	5,763	16	4.08	46	29.3	28
N thumberland	8,646	27	6.82	46	23,177	23	5,399	18	5.49	8	23.5	48
P ry	1,166	58	5.02	59	6,130	56	1,062	54	3.79	57	21.8	58
P ladelphia	316,905	1	16.40	4	261,460	1	45,949	1	7.40	1	42.1	3
P e	552	64	7.41	43	2,298	64	485	63	3.24	67	15.4	66
P tter	1,007	60	5.54	56	4,406	60	728	59	4.14	42	25.4	45
S uylkill	15,445	18	6.77	48	40,225	13	8,796	8	5.68	6	26.0	43
S der	625	62	3.08	66	5,172	58	910	56	3.91	51	22.2	57
S nerset	4,603	40	5.42	58	17,622	32	2,821	29	4.81	22	30.0	26
S livan	328	66	4.37	63	1,532	65	364	65	4.89	20	20.6	60
S quehanna	1,844	53	5.44	57	7,087	52	1,456	48	4.78	23	23.3	50
T ga	2,382	50	6.81	47	9,002	49	1,517	46	3.89	53	23.1	51
U ion	1,185	57	5.86	53	5,553	57	728	59	3.65	60	27.8	32
nango	6,261	33	9.79	26	14,749	36	2,062	37	4.34	32	31.0	24
rren	4,675	38	10.91	17	10,152	44	1,456	48	4.21	39	29.7	27
shington	23,480	11	11.14	16	39,650	14	5,459	17	5.31	13	38.6	9
yne	1,835	54	6.13	52	6,896	54	1,547	44	4.33	33	19.3	64
stmoreland	32,685	6	10.77	18	56,697	6	7,309	11	5.35	12	41.5	5
oming	1,032	59	6.20	51	4,789	59	1,092	53	3.49	64	15.3	67
rk	15,311	19	8.61	33	48,461	9	7,885	10	3.67	59	22.6	57
State	1,232,538		12.45		1,915,452		303,295		5.17		32.6	

* Registration year.

§ Including motor buses.

For sources of data see inside back cover.

TABLE VI—PUBLIC FACILITIES

County	(1-GC, FC) State Game Lands (Acres) 1940	(2-FW) State and National Forest Land (Acres) 1940	(3-FW) State and Federal Recreation Land‡ (Acres) 1940	(4-NP) Local and County Park and Recreation Area (Publicly Owned)‖ (Acres) 1939	(5) Public Forest and Park Land● (Total Acreage)	Rank
Adams	0	20,992	0	0	20,992	27
Allegheny	0	0	0	6,630	6,630	47
Armstrong	2,442	0	0	21	2,463	57
Beaver	37	0	4,760§	210	5,007	51
Bedford	33,690*	18,143	5,100	0	56,933	15
Berks	6,481	63	4,703§	1,520	12,767	36
Blair	12,132	0	0	172	12,304	38
Bradford	33,837	0	0	8	33,845	22
Bucks	2,467	38	130	630	3,235	53
Butler	2,094	0	0	3	2,097	59
Cambria	11,435	140	0	768	12,343	37
Cameron	12,598	118,880	1,000	0	131,478	7
Carbon	5,508	606	12,992§	60	19,166	28
Centre	23,441*	122,925	2,017	38	146,404	5
Chester	906	0	1,627§	183	2,716	54
Clarion	12,065	1	4,333	0	16,399	30
Clearfield	22,330	84,260	1,960	92	106,682	11
Clinton	10,571	231,448	100	15	242,034	2
Columbia	11,758	0	0	1	11,759	39
Crawford	5,695	0	12,070	43	17,808	29
Cumberland	783*	34,667	654	29	35,479	21
Dauphin	0	3,808	0	1,167	4,975	52
Delaware	0	0	0	305	305	65
Elk	46,574	174,952†	0	2	219,528	3
Erie	4,245*	0	3,200	353	7,798	44
Fayette	10,226	59	311	53	10,649	41
Forest	7,477*	101,751†	2,167	0	111,395	9
Franklin	6,967	37,938	1,229	14	44,938	19
Fulton	13,224	30,142	1,346	0	43,366	20
Greene	0	0	0	0	0	67
Huntingdon	17,160	64,554	378	11	81,725	12
Indiana	883	6	0	3	892	64
Jefferson	22,631	9,014	150	57	31,702	23
Juniata	4,856	8,977	0	0	13,833	34
Lackawanna	2,639	5,283	0	247	8,169	42
Lancaster	4,988	10	0	344	5,342	49
Lawrence	695	0	0	342	1,037	62
Lebanon	4,878	0	0	131	5,009	50
Lehigh	0	0	0	2,489	2,489	55
Luzerne	15,773	11	0	395	16,179	31
Lycoming	33,934	149,750	0	105	183,789	4
McKean	20,634	123,310†	0	119	144,063	6
Mercer	846	0	0	381	1,227	61
Mifflin	2,085	53,027	200	0	55,112	17
Monroe	8,295	6,568	0	11	14,874	33
Montgomery	0	0	1,609	742	2,351	58
Montour	228	0	0	3	231	66
Northampton	841	0	0	404	1,245	60
Northumberland	6,616	0	0	37	6,653	46
Perry	3,655	32,530	0	0	36,185	20
Philadelphia	0	0	0	7,584	7,584	45
Pike	1,678	59,599	52	0	61,277	14
Potter	12,177	250,859	96	30	263,066	1
Schuylkill	6,241	0	0	41	6,282	48
Snyder	0	27,418	0	0	27,418	25
Somerset	11,205	14,656	4,536§	0	29,887	24
Sullivan	41,204	38,884	1,891	0	80,088	13
Susquehanna	7,920	0	0	2	7,922	43
Tioga	8,134	100,173	171	0	108,307	10
Union	0	55,439	600	0	55,439	16
Venango	15,703	0	200	166	16,069	32
Warren	26,274	97,762†	0	139	124,175	8
Washington	2,310	0	0	174	2,484	56
Wayne	10,995*	0	0	0	10,995	40
Westmoreland	7,715*	5,391	1,885	198	13,439	35
Wyoming	24,844	1,177	0	0	26,021	26
York	761	0	0	225	986	63
State	627,781*	2,083,211†	71,467§	26,697	2,795,131	

* Including land owned by Pennsylvania Fish Commission. (Total 2,305 acres.)
† Including National Forest Land. (Total 431,801 acres.)
‡ Including State "Forest Park" land also listed as State Forest land. (Total 14,155 acres.)
§ Including Federal Recreational Demonstration Areas. (Total 32,863 acres.)
‖ Incomplete figures. Not including school playgrounds.
● Unduplicated aggregate of Columns 1, 2, 3 and 4.

TABLE VI—PUBLIC FACILITIES (Continued)

County	(6-USC) Total Area (Square Miles)	Rank	(7-USC) Total Forested Area (Acres) 1938	Rank	(8-H) State Highways (Mileage) 1941	Rank	(9-H) Rural Roads (Mileage) 1941	Rank
Adams	526	44	83,309	52	211	31	957	36
Allegheny	730	30	74,636	55	394	4	933	39
Armstrong	660	34	129,027	42	194	38	1,530	13
Beaver	441	51	77,352	53	228	29	900	41
Bedford	1,018	9	342,806	12	302	15	1,349	21
Berks	864	18	115,331	44	313	14	2,078	5
Blair	530	43	181,238	30	181	43	501	54
Bradford	1,147	3	230,799	22	259	21	2,157	4
Bucks	617	36	73,886	56	404	2	1,523	14
Butler	794	25	151,190	34	232	26	1,561	12
Cambria	695	31	251,900	17	232	27	925	40
Cameron	401	56	224,426	24	76	65	106	67
Carbon	405	55	180,956	31	95	63	443	57
Centre	1,115	5	521,377	3	330	8	723	47
Chester	760	27	88,676	51	408	1	1,936	7
Clarion	599	38	159,324	33	174	45	1,189	25
Clearfield	1,144	4	536,825	2	302	16	1,438	17
Clinton	902	15	460,017	6	143	56	446	56
Columbia	484	46	108,200	46	171	46	1,060	28
Crawford	1,016	10	173,380	32	261	20	1,949	6
Cumberland	555	40	75,742	54	193	39	966	35
Dauphin	520	45	117,155	43	175	44	893	42
Delaware	185	65	20,184	65	196	36	327	63
Elk	809	23	449,828	7	131	59	437	59
Erie	812	22	110,597	45	316	10	1,405	19
Fayette	800	24	241,072	19	198	35	1,568	11
Forest	420	54	242,229	20	96	62	278	65
Franklin	754	28	147,668	35	246	23	1,014	31
Fulton	435	52	140,791	36	148	51	478	55
Greene	577	39	47,854	60	152	50	1,306	22
Huntingdon	895	16	383,865	9	257	22	980	34
Indiana	831	21	212,442	26	314	13	1,638	10
Jefferson	652	35	233,631	21	195	37	1,081	27
Juniata	387	58	132,277	39	134	58	565	52
Lackawanna	454	49	135,337	37	202	34	598	50
Lancaster	945	12	70,688	58	398	3	2,523	1
Lawrence	367	60	42,626	63	146	52	740	46
Lebanon	363	61	46,092	61	144	55	684	48
Lehigh	347	62	33,698	64	146	53	1,020	30
Luzerne	891	17	330,304	13	295	17	1,135	26
Lycoming	1,215	1	538,236	1	314	12	1,357	20
McKean	997	11	512,843	4	235	24	506	53
Mercer	681	32	99,132	48	228	28	1,447	16
Mifflin	431	53	133,440	38	111	60	412	61
Monroe	611	37	228,241	23	202	33	765	45
Montgomery	484	46	65,196	59	324	9	1,227	24
Montour	130	67	17,739	66	60	66	297	64
Northampton	374	59	43,128	62	154	49	954	37
Northumberland	454	49	103,128	47	188	41	1,002	32
Perry	550	41	194,588	27	167	47	779	44
Philadelphia	135	66	877	67	1	67	152	66
Pike	545	42	292,280	15	160	48	440	58
Potter	1,092	6	503,756	5	206	32	842	43
Schuylkill	783	26	299,214	14	225	30	1,304	23
Snyder	329	63	72,154	57	103	61	660	49
Somerset	1,084	7	357,056	11	281	19	1,799	9
Sullivan	478	48	193,441	28	138	57	402	62
Susquehanna	836	20	184,164	29	376	5	1,424	18
Tioga	1,150	2	366,999	10	233	25	1,468	15
Union	318	64	96,946	50	91	64	416	60
Venango	675	33	251,675	16	190	40	991	33
Warren	910	14	440,286	8	184	42	940	38
Washington	857	19	100,462	49	293	18	1,890	8
Wayne	744	29	217,609	25	314	11	1,044	29
Westmoreland	1,025	8	245,400	18	363	6	2,207	3
Wyoming	396	57	128,933	41	144	54	581	51
York	914	13	129,121	40	347	7	2,397	2
State	45,045		13,194,869*		14,625		71,034	

* 13,194,869 acres equals 20,617 square miles (45.77% of the total area).

For sources of data see inside back cover.

TABLE VII—PUBLIC FINANCE

County	(1-PI) Total True Valuation* 1939-40 (Thousands)	Rank	(2-PI) True Valuation* Per Capita, 1939-40	Rank	(3-IA) Local Taxes Levied, 1939	Rank	(4-IA) Local Taxes Levied Per Capita, 1939	Rar
Adams	$18,356	48	$465.47	47	$553,222	52	$14.03	58
Allegheny	2,188,630	2	1,550.53	4	68,536,436	2	48.55	1
Armstrong	45,035	34	555.39	38	1,439,767	34	17.76	45
Beaver	179,874	17	1,147.49	13	4,735,881	16	30.21	10
Bedford	14,523	52	355.88	59	471,110	55	11.54	65
Berks	286,928	5	1,186.22	10	7,415,676	7	30.66	9
Blair	119,589	20	852.03	23	3,500,514	19	24.94	23
Bradford	19,251	47	380.34	54	1,034,147	42	20.43	35
Bucks	115,558	21	1,072.81	15	2,231,746	26	20.72	34
Butler	63,416	29	724.01	32	1,823,960	28	20.82	33
Cambria	182,429	15	854.63	22	5,764,115	11	27.00	17
Cameron	1,962	67	286.34	66	116,270	65	16.97	49
Carbon	34,616	38	560.72	36	1,649,739	29	26.72	19
Centre	23,281	43	442.54	49	788,750	44	14.99	56
Chester	171,331	19	1,263.26	8	3,103,559	22	22.88	29
Clarion	11,154	55	290.39	64	537,891	53	14.00	59
Clearfield	23,746	42	257.85	67	1,414,027	35	15.35	54
Clinton	12,257	54	354.69	60	576,805	50	16.69	51
Columbia	28,539	41	555.09	39	1,072,553	39	20.86	32
Crawford	60,182	30	840.01	24	1,580,097	30	22.05	31
Cumberland	58,116	31	776.89	29	1,373,529	37	18.36	42
Dauphin	203,545	11	1,147.31	14	4,953,863	15	27.92	14
Delaware	518,647	4	1,668.98	2	10,922,054	4	35.15	3
Elk	17,255	49	500.97	43	610,024	47	17.71	46
Erie	181,782	16	1,004.94	18	5,761,366	12	31.85	8
Fayette	98,348	22	489.30	45	4,462,142	17	22.20	30
Forest	2,279	66	393.54	52	79,088	67	13.66	60
Franklin	41,180	36	593.56	35	1,058,331	40	15.25	55
Fulton	3,058	64	286.52	65	92,190	66	8.64	67
Greene	57,616	32	1,289.79	7	1,229,766	38	27.53	15
Huntingdon	19,783	45	472.87	46	568,786	51	13.60	61
Indiana	44,281	35	554.52	40	1,493,432	32	18.70	40
Jefferson	19,596	46	362.29	58	832,995	43	15.40	53
Juniata	5,597	63	364.08	57	174,957	63	11.38	66
Lackawanna	205,196	9	681.16	33	8,985,456	6	29.83	11
Lancaster	250,764	6	1,180.00	11	4,053,076	18	19.07	39
Lawrence	73,702	26	760.78	30	2,636,640	24	27.22	16
Lebanon	71,997	28	991.13	19	1,407,924	36	19.38	38
Lehigh	187,265	14	1,054.82	16	5,188,304	14	29.22	12
Luzerne	243,997	7	552.63	41	14,369,241	3	32.55	7
Lycoming	73,214	27	781.93	28	2,297,848	25	24.54	25
McKean	93,725	24	1,653.79	3	1,879,976	27	33.17	6
Mercer	96,664	23	956.70	21	2,662,835	23	26.35	21
Mifflin	19,817	44	460.94	48	707,563	46	16.46	52
Monroe	35,580	37	1,193.88	9	732,436	45	24.58	24
Montgomery	604,952	3	2,091.47	1	9,972,937	5	34.48	5
Montour	5,739	62	371.07	56	220,502	61	14.26	57
Northampton	197,921	12	1,171.41	12	5,924,047	10	35.06	4
Northumberland	83,648	25	659.23	34	3,414,428	21	26.91	18
Perry	9.610	58	413.99	50	293,888	57	12.66	64
Philadelphia	2,528,454	1	1,309.17	6	72,540,477	1	37.56	2
Pike	9,783	57	1,312.80	5	210,707	62	28.28	13
Potter	6,147	61	337.73	63	315,795	56	17.35	48
Schuylkill	189,744	13	831.00	25	6,038,754	9	26.45	20
Snyder	7,075	59	350.11	61	260,148	60	12.87	63
Somerset	29,046	40	341.89	62	1,488,039	33	17.52	47
Sullivan	2,848	65	379.53	55	139,970	64	18.65	41
Susquehanna	16,794	50	495.50	44	680,910	48	20.09	36
Tioga	13,710	53	391.67	53	642,652	49	18.36	43
Union	10,226	56	505.06	42	265,162	59	13.10	62
Venango	50,665	33	792.16	26	1,508,682	31	23.59	27
Warren	31,407	39	734.00	31	1,037,315	41	24.24	26
Washington	205,196	10	973.18	20	5,323,713	13	25.25	22
Wayne	16,662	51	556.62	37	531,983	54	17.77	44
Westmoreland	240,016	8	791.06	27	6,976,032	8	22.99	28
Wyoming	6,913	60	413.90	51	282,629	58	16.92	50
York	179,144	18	1,006.30	17	3,487,453	20	19.59	37
State	$10,620,761		$1,072.78		$308,436,310		$31.15	

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* Taxable real estate.

TABLE VII—PUBLIC FINANCE (Continued)

County	(5-PI) State Appropriation for Education, 1940-41	Rank	(6-PI) State Appropriation for Education Per Capita, 1940-41	Rank	(7-PI) State Appropriation for Education Per Pupil, 1940-41	Rank	(8-PI) Education Cost* Per Pupil, 1940-41	Rank	(9-PA) Persons Dependent on Public Relief,§ 1941	Rank	(10-PA) Per Cent of Population Dependent on Public Relief,§ 1941	Rank
Adams	$183,890	53	$4.66	29	$28.27	21	$69.79	49	1,949	58	4.9	57
Allegheny	2,815,470	1	1.99	66	13.45	65	122.97	3	125,999	2	8.9	29
Armstrong	349,562	32	4.31	34	20.95	42	62.69	61	6,336	30	7.8	36
Beaver	490,737	19	3.13	55	16.45	61	85.30	30	8,487	21	5.4	52
Bedford	300,840	35	7.37	8	34.35	11	65.18	56	5,590	32	13.7	7
Berks	660,260	12	2.73	60	16.52	60	97.72	10	15,066	12	6.2	47
Blair	490,914	18	3.50	48	19.86	46	83.22	32	13,511	13	9.6	24
Bradford	433,088	23	8.56	4	45.21	6	98.91	9	5,139	33	10.2	22
Bucks	368,778	29	3.42	51	21.59	38	82.84	33	3,708	45	3.4	65
Butler	317,262	33	3.62	45	18.98	50	67.45	52	4,985	34	5.7	48
Cambria	888,377	8	4.16	37	21.17	41	79.42	36	17,785	9	8.3	33
Cameron	51,741	65	7.55	7	41.52	8	90.61	19	344	67	5.0	55
Carbon	239,907	43	3.89	41	21.52	39	85.41	29	4,026	41	6.5	44
Centre	293,602	37	5.58	18	27.50	24	64.52	59	4,763	36	9.1	27
Chester	470,319	21	3.47	50	20.57	43	94.89	14	6,450	29	4.8	62
Clarion	250,233	42	6.51	13	32.19	14	68.13	50	3,246	48	8.5	32
Clearfield	625,885	13	6.80	11	33.30	12	65.47	53	15,706	11	17.1	1
Clinton	188,221	51	5.45	21	29.57	19	71.01	46	4,015	42	11.6	17
Columbia	278,210	40	5.41	23	28.19	22	78.18	38	3,955	44	7.7	38
Crawford	370,033	28	5.16	26	30.21	18	85.74	28	4,780	35	6.7	43
Cumberland	279,220	39	3.73	43	19.86	47	70.49	47	3,978	43	5.3	53
Dauphin	441,410	22	2.49	62	15.75	63	96.21	11	12,303	14	6.9	41
Delaware	761,436	11	2.45	63	17.10	58	123.64	2	9,120	19	2.9	66
Elk	184,753	52	5.36	24	31.89	15	79.28	37	2,148	56	6.2	46
Erie	532,825	16	2.95	58	18.60	53	105.84	6	10,278	17	5.7	49
Fayette	920,744	7	4.58	31	21.79	36	70.08	48	27,399	6	13.6	8
Forest	56,437	64	9.75	2	55.00	2	101.04	7	449	65	7.8	37
Franklin	269,781	41	3.89	40	21.17	40	65.20	55	3,359	47	4.8	59
Fulton	76,830	62	7.20	9	37.28	9	67.55	51	847	64	7.9	35
Greene	218,490	49	4.89	28	21.94	35	75.34	41	4,459	38	10.0	23
Huntingdon	233,250	46	5.58	19	26.66	26	61.57	63	4,440	39	10.6	19
Indiana	409,657	24	5.13	27	23.84	31	60.80	64	10,322	16	12.9	14
Jefferson	302,701	34	5.60	17	27.62	23	64.23	60	8,199	22	15.2	3
Juniata	80,978	61	5.27	25	26.00	28	58.11	67	1,643	60	10.7	18
Lackawanna	1,012,690	5	3.36	53	19.82	48	95.27	13	49,684	4	16.5	2
Lancaster	570,528	15	2.68	61	15.97	62	74.04	45	8,010	26	3.8	64
Lawrence	349,714	31	3.61	46	17.36	57	80.54	34	10,156	18	10.5	20
Lebanon	233,076	47	3.21	54	18.01	55	74.48	43	3,487	46	4.8	61
Lehigh	374,600	27	2.11	65	13.89	64	88.95	21	7,114	27	4.0	63
Luzerne	1,537,177	3	3.48	49	18.89	51	96.17	12	59,935	3	13.6	9
Lycoming	402,123	25	4.29	35	24.24	30	89.25	20	8,107	24	8.7	31
McKean	238,155	44	4.20	36	22.14	34	100.34	8	2,759	51	4.9	58
Mercer	363,739	30	3.60	47	18.65	52	77.42	39	7,016	28	6.9	42
Mifflin	192,905	50	4.49	33	21.63	37	65.36	54	4,029	40	9.4	25
Monroe	135,344	57	4.54	32	24.40	29	91.03	18	3,094	50	10.4	21
Montgomery	813,589	10	2.81	59	18.37	54	117.88	5	8,079	25	2.8	67
Montour	47,732	67	3.09	56	20.17	45	62.25	62	2,068	57	13.4	11
Northampton	399,079	26	2.36	64	13.30	66	87.93	24	8,142	23	4.8	60
Northumberland	585,343	14	4.61	30	27.00	25	87.74	25	19,168	8	15.1	4
Perry	148,993	56	6.42	14	31.82	16	65.12	57	1,178	62	5.1	54
Philadelphia	2,757,663	2	1.43	67	12.27	67	120.31	4	176,097	1	9.1	26
Pike	49,873	66	6.69	12	46.14	4	152.31	1	414	66	5.6	50
Potter	168,896	55	9.28	3	48.56	3	94.50	16	2,356	53	12.9	15
Schuylkill	943,383	6	4.13	38	23.69	32	88.39	22	28,651	5	12.5	16
Snyder	112,074	59	5.55	20	29.10	20	60.51	65	2,637	52	13.0	13
Somerset	483,218	20	5.69	16	26.17	27	64.64	58	12,061	15	14.2	5
Sullivan	85,914	60	11.45	1	59.54	1	94.75	15	1,018	63	13.6	10
Susquehanna	286,600	38	8.46	6	43.33	7	87.69	26	4,491	37	13.3	12
Tioga	296,495	36	8.47	5	45.24	5	94.40	17	3,112	49	8.9	30
Union	76,033	63	3.76	42	22.83	33	59.08	66	1,502	61	7.4	39
Venango	234,427	45	3.67	44	20.50	44	80.52	35	5,735	31	9.0	28
Warren	232,236	48	5.43	22	30.21	17	88.37	23	2,353	55	5.5	51
Washington	826,770	9	3.92	39	19.67	49	75.30	42	17,167	10	8.1	34
Wayne	178,282	54	5.96	15	33.29	13	87.20	27	1,916	59	6.4	45
Westmoreland	1,025,143	4	3.38	52	17.05	59	74.46	44	21,803	7	7.2	40
Wyoming	119,320	58	7.14	10	36.06	10	84.34	31	2,354	54	14.1	6
York	527,798	17	2.96	57	17.95	56	75.41	40	8,914	20	5.0	56
State	$30,644,753		$3.10		$19.00		$94.85		849,391		8.6	

* Less debt service and capital outlay.

For sources of data see inside back cover.

§ Unduplicated average number of persons dependent on aid to the aged, blind pension, aid to dependent children, general assistance and work relief, including W.P.A.

The final two columns in this table (page 11) must be interpreted with unusual care. In some counties, because of the special types of industries engaged in, employment is largely on a part-time basis. This is particularly true as to seasonal canning operations in certain of our agricultural counties, and considerably reduces the average compensation per employee, which is figured on an annual basis.

The tables of compensation per employee and of wages per wage earner, as well as those of value of product per employee and capital invested per employee, must also be interpreted with this fact in mind.

The table showing the percentage of the employees who are male brings out the extremely varying nature of our State's manufacturing enterprises, and the widely different social conditions resulting from this variety. In two counties of our State in 1940, 100% of all industrial workers were male, while in two counties the percentage of male workers in industrial plants was below 40. As may be seen from the map "Sex of Employees," page 15, a very great contrast exists in this characteristic between counties in the west and in the east.

Commerce and Trade

The value of the annual sales in Pennsylvania's retail and wholesale stores, and service establishments is not greatly below the total value of the product of the State's mines and manufactures. In 191,142 stores and shops more than 509,000 Pennsylvanians normally earn their livelihood.

In Philadelphia and Allegheny Counties the value of sales frequently exceeds the value of manufactures, largely because of the position of those cities as wholesale distributing centers, and as marts for the retail trade of neighboring counties.

The table of Retail and Service Sales Per Capita, while providing valuable indications as to a county's cash income and expenditure, must be interpreted in the light of the community's occupations and social habits, and it must also be remembered that the presence of a large retail center in a neighboring county may attract a considerable volume of local purchasing away from a community's own shops.

Agriculture

Between 1935 and 1940, Pennsylvania's farm population declined by 69,914, though the density of farm population slightly increased in the same period and the average value of farm land per acre rose from $54.00 in 1935 to $59.22 in 1940.

Pennsylvania's farms occupy almost exactly one-half of the State's total area, the proportion of land devoted to agriculture having declined in recent years due, in part, to the inclusion of large acreages of submarginal farm land in State and National forests, parks, and game preserves.

Despite the return of such areas to more suitable uses, and also in spite of the great concentrations of mining and manufacturing in the State, Pennsylvania has maintained her position as one of the Nation's great agricultural areas.

The State's investment in farm lands, buildings, and implements is nearly a billion dollars. It occupies first position in some important classes of farm products, and is among the leaders in many.

Distribution of Wealth

The distribution of certain indices of material wealth is indicated by the various columns of Table V as well as by columns 1 and 2 of Table VII, which show the estimated true valuation of taxable real property within a county's area. The number of passenger car registrations in a county, column 3, Table V, while an accepted index of material well-being, is also greatly influenced by occupations and by needs of communication in farm areas. Rural counties generally lead in car registrations per thousand of population, while urbanized counties in which public conveyances are abundant have relatively few cars per thousand.

Conversely, the population per passenger car as given in column 5, Table V, is usually highest in urban and lowest in rural areas.

It is only when marked variations from this type of distribution occur that car registrations may be regarded as indicative of economic status.

Under a war time economy where transportation of workers is a matter of great national concern the distribution of passenger automobiles assumes unusual importance. The rationing or restriction of the sale of tires and gasoline is naturally most serious in areas where the number of automobiles per hundred of population is highest, or conversely, as shown in Table V, where the population per passenger car is least, as it is generally in such areas that dependence on motor transportation is of the greatest local importance.

During the first World War, when there were only 441,224 passenger cars in Pennsylvania, dependence on automobile transportation was not very critical. By 1941 the increase in Pennsylvania's registered passenger cars since 1919 was 1,587,896, a rise of 360%, which is some measure of the transportation difficulties immediately ahead of us. This is especially true since the availability of automobiles has frequently lead to the location of homes and factories in areas where public transportation is today inadequate or altogether lacking.

Public Facilities

The distribution of the areas of publicly owned lands in Pennsylvania is of importance to the recreational needs of the people of the State. Pennsylvania, one of the outstanding scenic States of the east, contains more than 13,000,000 acres of forest land, of which nearly 3,000,000 acres are included in State and National Parks, Game Lands, and Local Recreation Areas.

Since wild lands and forested lands are usually available for public ownership only in rural and non-industrial areas, it is inevitable that outdoor facilities for recreation will be most abundant where least needed.

County and community parks are numerous in Pennsylvania, yet there are many areas where full provision for healthful outdoor pleasures has not yet been made. This fact is emphasized by the war time need for relief from industrial strain in a year when motor car travel is curtailed by shortages of rubber and gasoline.

Public Finance

Table VII gives details by county of various types of public assistance, and of real estate values and taxation. Fuller information in regard to local taxation and expenditure may be had from the May-June 1940 issue of **Pennsylvania Planning**, copies of which are still available for a limited distribution.

The Use of These Data

The tables published in this issue of **Pennsylvania Planning** are compiled primarily for use as a basis for county-wide and local programs of community self-appraisal. Population data are always of first importance as a basis for community self-knowledge. In certain areas in our State there exist today conditions of age distribution, of sex distribution in the various age groups, of population gains or losses, and of birth and death rates which should govern the whole pattern of public policy and expenditure.

The future of our schools, the characteristics of our present labor resources, the purchasing habits, the social needs, and the economic capacity of a community are reflected in such data.

While the present war effort may temporarily change both economic and social structures, past experience, over a long term of years, reveals that after such a nation-wide shakeup as that we are now going through, the old trends tend to reassert themselves and the old problems to reappear.

The proportion of a county's wealth derived from trade, manufacture, and agriculture largely determines where its chief interests lie, and greatly affects the stability of its income under changing national conditions.

The operating ratios of its industries, as given in Table II, serve to indicate the extent to which specialization has been carried in the industrial pattern. A very great contrast exists in such ratios between the heavy industries which involve large capital expenditures and a small contribution of labor per unit of value produced, and certain industries like the manufacture of clothing where the capital investment and the value of product per employee are relatively low.

A study, made by the people of each county, of the data revealed in these Tables, together with a consideration of the county's ranking orders in regard to all of the characteristics listed here, will serve to call attention to many of the fundamental local problems which must be faced in any period of post war readjustment.

SOURCES OF COUNTY DATA

Basic data used in the preparation of the preceding tables were supplied by the agencies listed below:

- Pennsylvania Fish Commission (FC)
  - Department of Forests and Waters (FW)
  - Game Commission (GC)
  - Department of Health, Bureau of Vital Statistics (VS)
  - Department of Highways (H)
  - Department of Internal Affairs, Bureau of Statistics (IA)
  - Department of Public Assistance, Bureau of Research and Statistics (PA)
  - Department of Public Instruction (PI)
  - Department of Revenue, Bureau of Motor Vehicles (R)
- United States Department of Commerce, Bureau of the Census (USC)
  - Department of the Treasury, Collectors of Internal Revenue (IR)
  - Department of the Interior, National Park Service (NP)

Data sources for individual tables may be identified by the initials listed above which appear at the head of each column.

Further information in regard to many of the classes of items listed in these tables is available in the files of the Pennsylvania State Planning Board, including population, financial, and land use data for each of the State's 2,561 civil subdivisions.

MAPS

In preparing the plates of maps illustrative of various phases of county data the uniform practice has been followed of coloring **black** the twenty-two counties of highest rank in respect to the data illustrated. The twenty-three median counties are colored **grey,** and the twenty-two lowest counties, **white.** Each column of data and each map must be individually interpreted.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols, 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

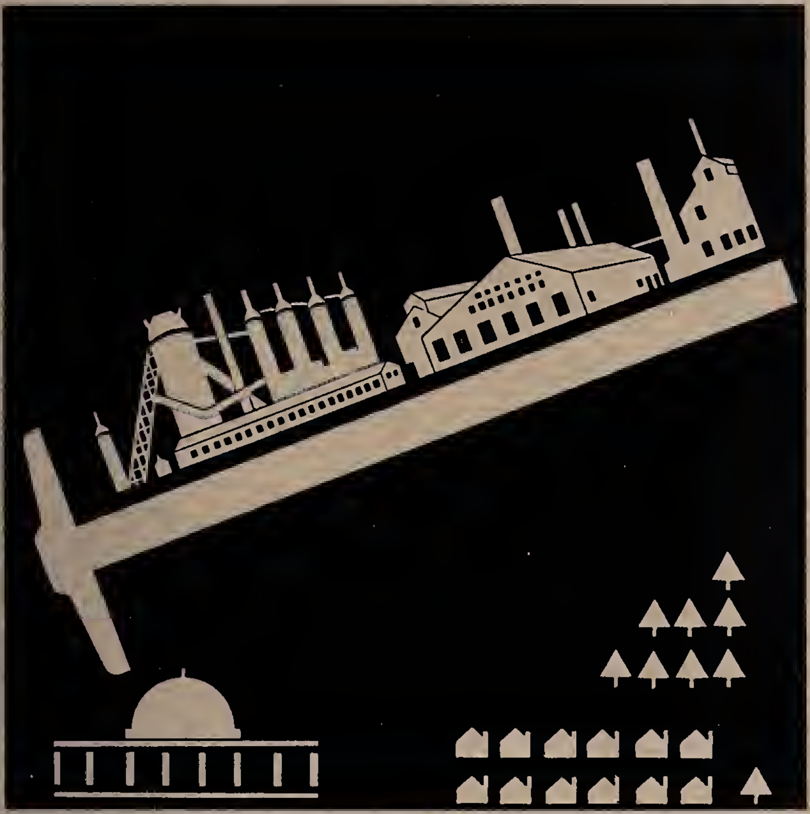
*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal programs:

*Local Tax Rates, May-June, 1940.
*Air Photography, November, 1940.
*Defense Problems, January-March, 1941.
*Post Defense Problems, April-June, 1941.
*Index of Publications, August, 1941.
*Community Self-Appraisal, September-October, 1941.
*Self Appraisal for Increased Production, November, 1941-January, 1942.
Community Self Appraisal (Revised Edition), April, 1942.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

PENNSYLVANIA PLANNING



DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA
STATE PLANNING BOARD

JULY · 1942 — #5

LOCAL PLANNING WAR AND POST WAR

8|5

P38.49
2.6

COMMONWEALTH OF PENNSYLVANIA

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

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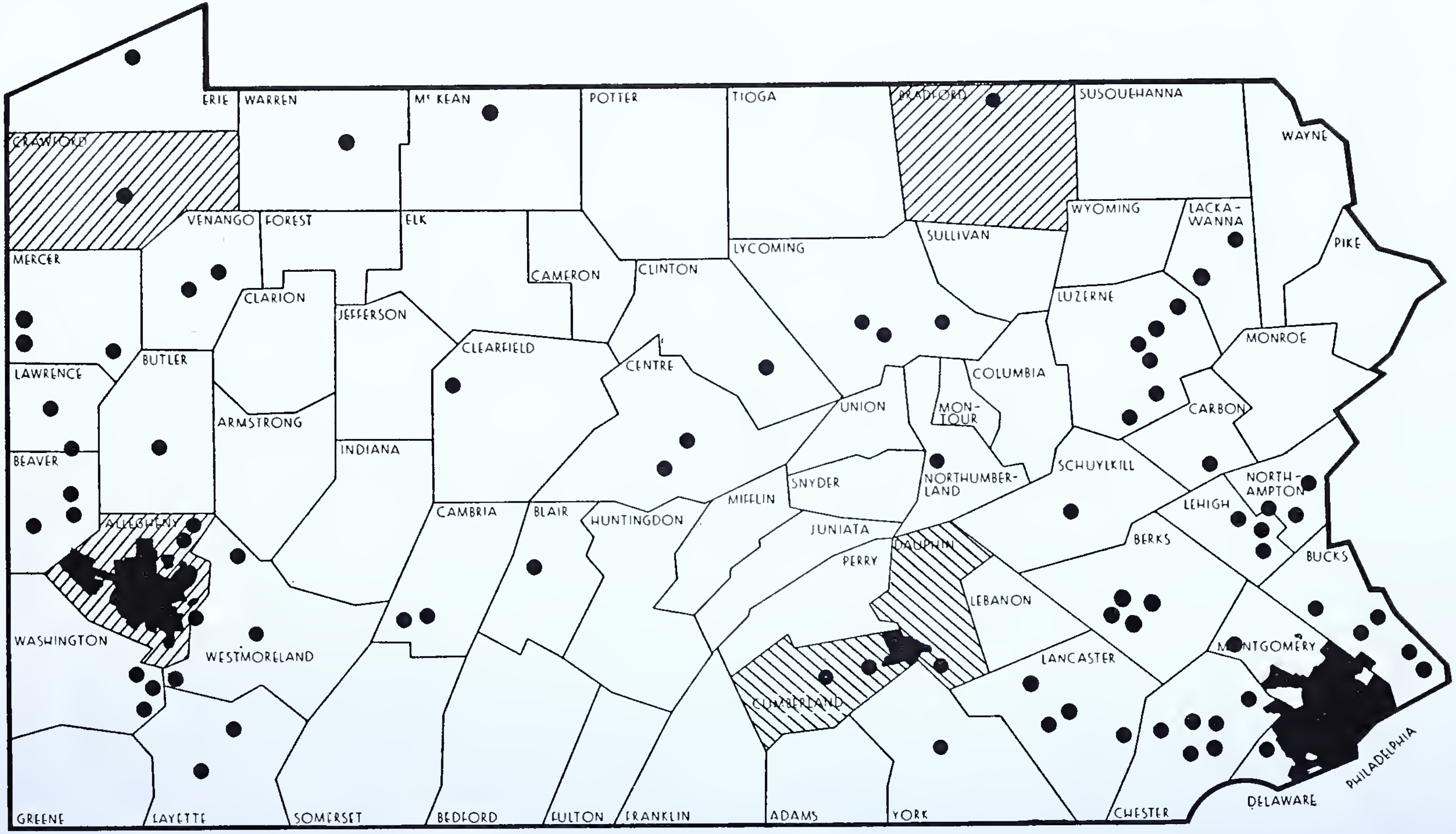
Planning and Zoning Activities 19



PLANNING AND ZONING COMMISSIONS IN PENNSYLVANIA

Problems of Local Planning

Let us begin by asking a few fundamental questions.

How can every productive unit in the state of Pennsylvania be kept in gear with the war effort?

How can workers get to their jobs despite a serious prospective shortage of rubber tires?

How can rural and urban communities meet the civic problems involved in a great increase of population from war industries or of a decline in population caused by migration to war industries?

How can local merchants and wholesalers whose goods are affected by priorities be kept in business to insure our distribution when war is over?

How can local resources be effectively pooled for their full and efficient use and for economy of transportation?

How can the housing problem be met in a time of shortage of raw materials?

How can public morale be maintained when the customary means of recreation are growing less and less accessible?

These are problems which must be faced and solved if the democratic methods of government are to prove their worth for the rest of the 20th Century.

They are problems of wartime efficiency which confront every community in our Commonwealth. They are all problems of local planning—problems that no agency but local agencies can adequately handle.

Whatever agency does face them and work out adequate answers will deserve the gratitude not only of the people in the town or city where it is done but also the gratitude of all our people who believe in democracy and in its power to solve its own problems.

Under Pennsylvania law that power now resides in the people of every township, borough and city in the State. But the power must be used to be effective.

The essence of the answer to all these problems lies in definite self-knowledge—and in maintaining some means by which such knowledge can be continuously gained, organized and interpreted.

This is obviously a local responsibility.

Community, county and regional planning boards, as authorized and empowered under Pennsylvania law, provide a continuing means for meeting such problems as may arise in every locality under normal conditions and which have increased in seriousness under the pressure of war production.

Such a planning board, in addition to its normal peacetime duties of studying a community's public problems of land use and control, is also in a favorable position, when implemented by a zoning ordinance, to assist and guide in the location of emergency housing, to provide information and guidance as to plant locations, to undertake the correlation of workers' transportation when a special agency has not been provided, and to guide such an agency if it has been created. It is also in a position to provide or acquire vital information as to the effect of industrial changes on the community's resources—its schools, its water supply, its streets and roads, and its police and fire protection.

The pooling of local resources to conserve transportation, to make the most economical use of local sources of supply for local industry, and to lend the utmost support to the war effort depends almost wholly on local self-knowledge.

No one operating from outside a community can possibly reflect the community's needs so well as can its own citizens. It is on this basis that the Planning and Zoning Enabling Laws of Pennsylvania were enacted.

These grants of power have proved their worth wherever they have been solidly applied. This is particularly true in all the localities in Pennsylvania where the construction of defense plants has brought a large number of temporary workers into communities that did not have housing adequate for such a sudden increase in their population. It is also true for those communities where the expansion of existing plants has brought about new problems, not only of the housing of additional workers, but also of providing those workers and their families with needed facilities such as schools and recreation.

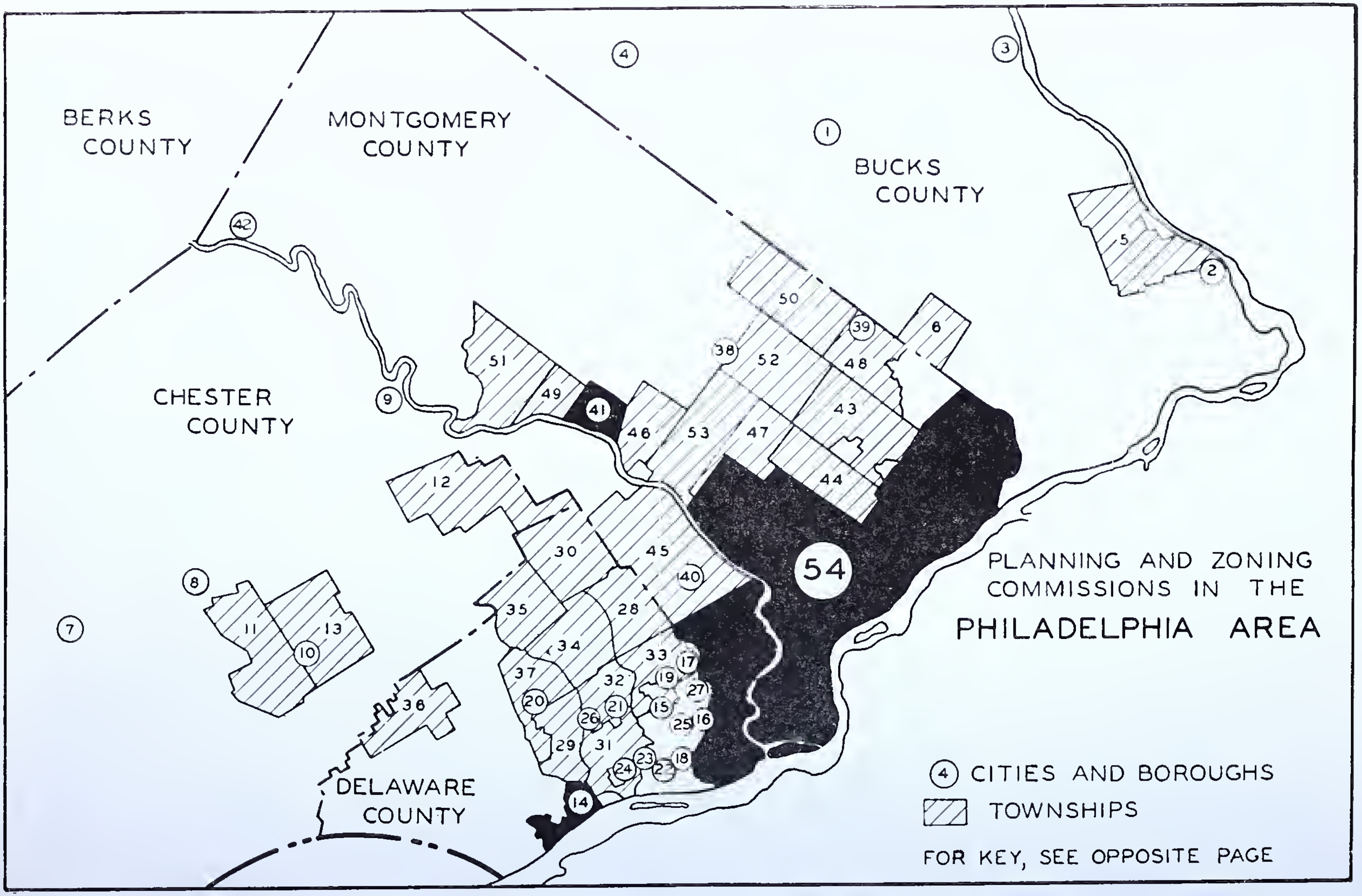
Pennsylvania planning and zoning laws have enabled communities, where such problems have arisen, to deal with them wisely and to assist the efforts of the United States Government in solving construction and housing problems involving thousands of workers.

Experience within the past two years throughout the country has shown that the temporary housing, servicing, entertaining, and policing of workers crowded into our towns and cities, or moved into our rural districts, can occasion difficulties in a large area surrounding the sites of defense plants. Some of these difficulties exist only during the construction period, but others, such as depreciated property values and a lowered public tax base, may linger for years.

Experience has also shown that these disturbing effects may be minimized if local officials wisely use the planning and zoning powers which have been granted by the General Assembly to cities, boroughs, townships, and counties of Pennsylvania.

In the rush made necessary by a great national emergency, communities that do not have zoning protection may very well find that many years of their future existence have been handicapped by the hasty and unplanned construction which is likely to take place within the next year.

The proper operation of our own war program may also be seriously handicapped through the confusion and dissatisfaction that can occur as a result of improper emergency construction, badly planned housing locations and unnecessary congestion.



PLANNING AND ZONING COMMISSIONS IN THE PHILADELPHIA AREA

④ CITIES AND BOROUGHS
▨ TOWNSHIPS

FOR KEY, SEE OPPOSITE PAGE

One of the first signs of a full realization of the importance of zoning laws in the present emergency is the fact that Crawford County has now adopted a zoning ordinance, and that it is the first county in Pennsylvania to take full advantage of the County Zoning Enabling Act passed by the General Assembly in 1937. This action of the Crawford County Commissioners was felt to be necessary because of a large war industry plant now being erected in that County, but many others of the communities of our State, already feeling the effect of war time expansion in their midst, must now act rapidly if they wish to protect themselves and at the same time to speed the Nation's war effort.

On the conclusion of this war other questions will immediately arise which will need the continuous attention of the citizens of every community—questions of public improvements which might provide employment during a period of post-war readjustment, questions as to the industrial future of regions, towns and counties now largely engaged in war work.

KEY TO PHILADELPHIA AREA

BUCKS COUNTY

		Key
Boroughs,	1. Doylestown	P & Z
	2. Morrisville	Z
	3. New Hope	P
	4. Sellersville	Z
Twps., 2nd Cl.	5. Lower Makefield	Z
	6. Upper Southampton	Z

CHESTER COUNTY

City	7. Coatesville	P & Z
Boroughs	8. Downingtown	P & Z
	9. Phoenixville	Z
	10. West Chester	P & Z
Twps., 2nd Cl.	11. East Bradford	Z
	12. Tredyffrin	Z
	13. West Goshen	Z

DELAWARE COUNTY

City	14. Chester	P & Z
Boroughs	15. Aldan	Z
	16. Colwyn	Z
	17. East Lansdowne	Z
	18. Folcroft	Z
	19. Lansdowne	Z
	20. Media	Z
	21. Morton	Z
	22. Norwood	Z
	23. Prospect Park	Z
	24. Ridley Park	P & Z
	25. Sharon Hill	Z
	26. Swarthmore	Z
	27. Yeadon	Z

DELAWARE COUNTY (Cont.)

		Key
Twps., 1st Cl.	28. Haverford	P & Z
	29. Nether Providence	Z
	30. Radnor	Z
	31. Ridley	P & Z
	32. Springfield	Z
	33. Upper Darby	Z
Twps., 2nd Cl.	34. Marple	Z
	35. Newton	Z
	36. Thornbury	Z
	37. Upper Providence	Z

MONTGOMERY COUNTY

Boroughs	38. Ambler	P & Z
	39. Hatboro	Z
	40. Narberth	P & Z
	41. Norristown	Z
	42. Pottstown	P
Twps., 1st Cl.	43. Abington	Z
	44. Cheltenham	Z
	45. Lower Merion	P & Z
	46. Plymouth	Z
	47. Springfield	Z
	48. Upper Moreland	Z
	49. West Norriton	Z
Twps., 2nd Cl.	50. Horsham	Z
	51. Lower Providence	Z
	52. Upper Dublin	Z
	53. Whitemarsh	Z

PHILADELPHIA COUNTY

City	54. Philadelphia	P & Z

Which of the community's former industries will be able to return profitably to the pattern of manufacture which the war effort has now superseded? Is there a better pattern, one more suited to the probable needs of the middle years of the twentieth century?

Can some part of the adjacent farm land be profitably used for the production of crops suitable for industrial use in the community's manufactures?

What effect will post-war readjustment have on population movement? To what extent should such movement be encouraged or retarded? What effect will the changing age patterns of the community have on its purchasing habits, its recreational needs, on its schools, and on its taxes?

These also are local problems, all of which admit of intelligent and useful answers. They are proper problems for local planning boards which, in all the foreseeable future, must be as much concerned with how people can earn a living as with how people may live to the best advantage and satisfaction.

In dealing with all such questions as these, the function of the State through the State Planning Board of the Department of Commerce is solely advisory. The Planning Board stands ready to provide advice and assistance in the setting up of local, county or regional planning and zoning boards. But under the provisions of the Planning and Zoning Enabling Acts of the Commonwealth, all actions taken for the solution of Planning and Zoning problems are matters that are of wholly local responsibility and are completely under control of local authorities.

In the following article something of the scope of this enlarged field of community planning is developed. Meanwhile, reference may be made to the three manuals on Community Planning issued by the State Planning Board for use in framing and carrying through a program of planning and zoning for Pennsylvania communities. (See inside back cover.)

After War— What?*

by

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Consultant, New Jersey and Pennsylvania
State Planning Boards

However slowly, the peace day is approaching. When it comes, this Country will be faced with the tremendous task of shifting more than twenty-million people from war-time to peace-time occupations. This can not be done overnight. It is taking months and years to retool American industry for war production. It may take nearly as long to turn industry back into normal channels.

Depending in range and volume upon the length and the severity of the war, there will be a great after-war shortage of and demand for consumers' goods—automobiles, houses, refrigerators, clothes, and butter, things denied during all-out war production. In meeting these accumulated shortages, in restoring and improving the American standard of living, there is possibility of a renewed economic prosperity of indefinite duration. But between the destructive "prosperity" of war and the constructive prosperity of peace lies a formidable gulf—the period of transition from a war economy to a peace economy. Successful bridging of this gulf may well require as much thought and planning as does winning the war.

Much consumer demand must wait until assembly lines are readjusted to turn out the things demanded. Meanwhile many men must stand idle unless interim work can be found for them.

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Idleness exhausts purchasing power. Long idleness by a large section of the population will mean no money to buy goods when produced—the first turn into the dizzy spiral of depression, so fresh in our memory. It is not likely that, after the strains and the drains of a long war, we shall be able to recover from another deep depression very quickly or very satisfactorily. The debacle of a recurring major depression need not and must not happen. It would be almost as bad as losing the war.

The Public Works Reserve—A Stop-Gap

Government, naturally, must assume the chief responsibility for leading the Nation safely from war to peace. Among other things, government at all levels may be called upon to accelerate the rate and volume of public work to ease the strain of unemployment while the factories are being reconditioned. At the end of the war, almost every municipality, county, and state will have an accumulation of needed improvements deferred because of lack of materials and labor or because of other war-time conditions. And there is no end of desirable public improvements never yet made because of lack of funds. Out of such potential public works the Federal Government is now building the huge works reservoir known as the Public Works Reserve and to be used, if and when necessary, as a depression preventative. By no stretch of the imagination will a stepped-up public works program provide direct employment for all the twenty-odd million people who, at the end of the war, may find themselves temporarily out of jobs. It should, however, be sufficient to play an extremely important part in bridging the gap to normal employment.

Effective and satisfactory use of the public-works tool in this fashion will require much preparatory work by government. That work should be started now. It includes: (1) building a cash or credit reserve by state and local governments to finance a deferred improvement program, with or without Federal aid; (2) comprehensive planning at all levels of government to determine best location and kind of needed improvements, and the order in which they should be built; (3) advance preparation of working or construction plans and specifications for first-priority projects; and (4) advance acquisition of lands needed for carrying out improvements like highways, parks, and public buildings.

Municipal and county cash reserves may not be feasible or possible except through additional legislation. But the same thing, in effect, may be accomplished through the retirement of debt, through strict conformance to the "pay-as-you-go" policy in current spending, and through the advance acquisition of needed lands.

Item (2) is especially important because, in the absence of comprehensive planning, public works programs are liable to error, waste, and extravagance. Without the under-pinning of good over-all plans, the new Public Works Reserve will be just another big grab-bag of public works like that of the early thirties, out of which came many white elephants but too few most-needed improvements. The first emergency listing of Public Works Reserve projects is now going forward. Presumably, these lists will be continuously subject to revision. The city, town, or state interested in making the most of a possible post-war public works program will make sure, by more planning now, that the final project lists really represent greatest local need.

As with World War I, the peace may come suddenly. The wheels of thousands of great war industries may stop overnight. If the Public Works Reserve is to serve its intended purpose, it may have to be thrown into operation at a moment's notice. It will be too late, when peace comes, to start the long process of making construction plans and buying land. A large neucleus of both plans and land should be gotten in readiness now. It is possible that Federal aids will shortly be made available for making plans. Having determined the general nature and the proper placing of improvements, through comprehensive planning, the states and localities should be able to acquire much of the needed land through foreclosure of tax liens and through purchase, by use of funds that ordinarily would be spent upon current improvements.

Avoidable Wastes and Dislocations

Great population and industrial centers are in process of dislocation incidental to all-out war production. Everywhere, new houses, factories, and similar facilities are being built with chief emphasis upon speed. Speed is essential. But it is important also to avoid unnecessary destruction of resources like good farm land and established residential and industrial areas, and important, where possible, to place and design war-time improvements for peace-time usefulness. The war will cost enough without adding the costs of too much single-mindedness in setting up and equipping the war machine. We fight a fire to save the house for further use. What good to defeat the flame and destroy the place by over-zealous use of the axe?

This is not to suggest delay of any essential war operation, but to offer the timely thought that it takes no longer to do a thing by plan than it does to do it by guess. Wherever planning facts and developed plans are available they should be used to the fullest possible extent by both the army and the civilian builders of defense houses and industries, highways, airports, army camps, and all other such facilities. Where planning facts and plans do not exist they should be assembled and made now as a part of the war effort. By thus bringing planning and planning processes more effectively into the picture, we may yet avoid many post-war headaches and greatly increase the salvage value of defense improvements.

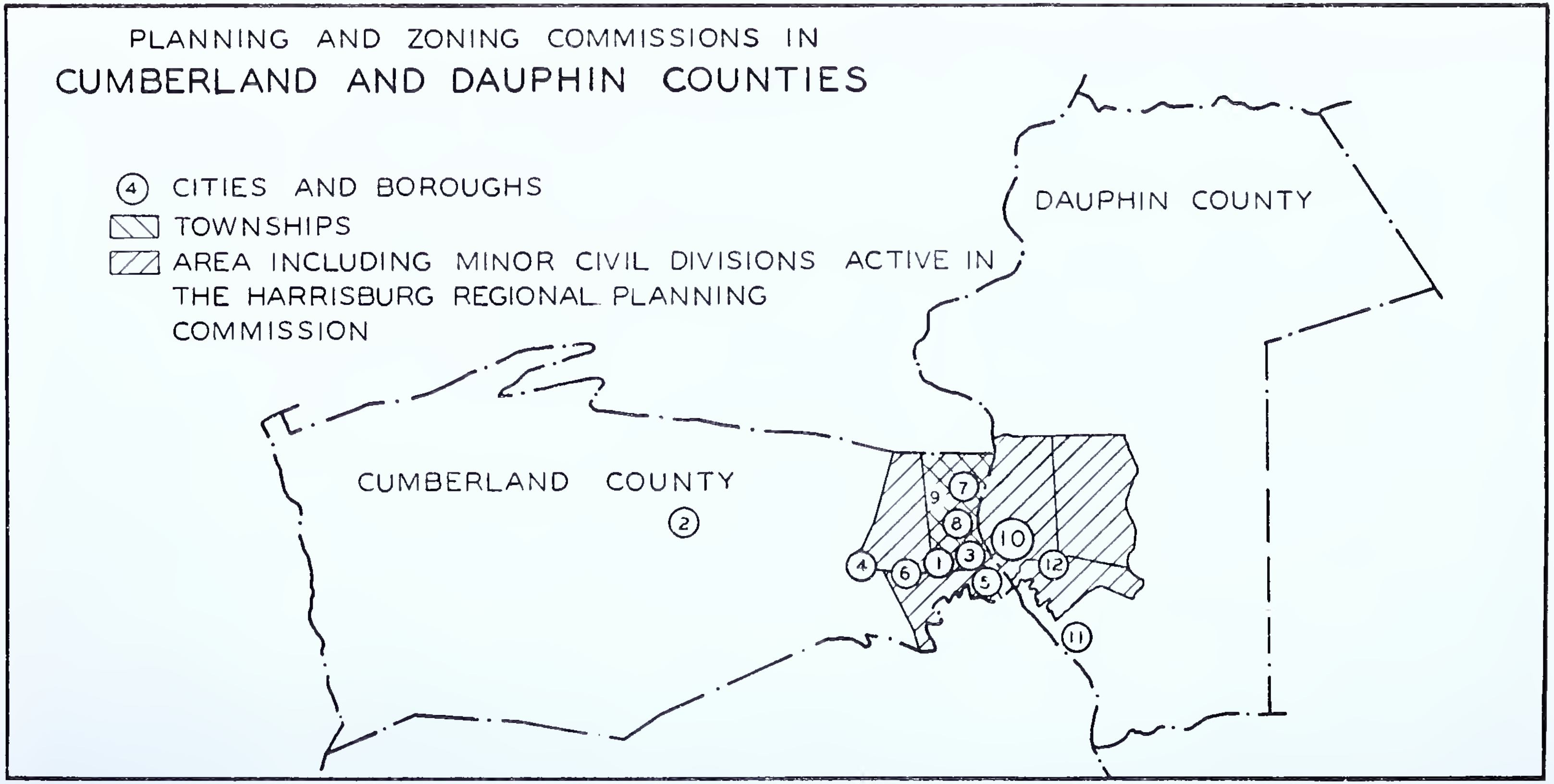
The Next Big Job

We have talked of ways and means for lessening the depth of the valley between war-time and peace-time production. No one yet knows how high may be the hill on the peace-time side of that valley. Before the war, we were discovering that then-existing industries could more than satisfy purchasing power, while operating below full capacity. By-products of this war will include miles of new factories and machines, and many new and improved methods, capable of turning out all kinds of things at an unprecedented speed and with an unprecedented economy of man-power. Further, if the war is of long duration, we may have learned a lasting thrift effectively reducing the rate of consumption of industrial standbys like automobiles. Increased purchasing power, possible through increased real wages, expanded use of the airplane, and stimulated demand for new gadgets, may help somewhat for a few years. But there is grave possibility that, after all these things are done, there will remain a large and dangerous residue of idle men and machines, producing a situation which must be corrected by either complete social reorganization, or finding large, new sources of employment.

The most potent great new source of employment is in extensive rebuilding of American cities—not just pecking away at the job by tearing down a few buildings here and building a few others there, but wholesale reconstruction of hundreds and thousands of blocks of outmoded urban districts. How such a tremendous task may best be accomplished is a matter for much thought and exploration. Chief difficulties, of course, will be in devising workable legal and financial machinery, for there will be no lack of men and materials to do the work. Experimental legislation along these lines has already been enacted by three states. Obviously, this is not a job to be undertaken hastily. If and when done, it must be through a higher order of municipal planning than usually found in this Country.

"PUBLIC WORKS ENGINEERS' YEARBOOK 1942"—American Public Works Association, Chicago, Illinois, 1942. 387 pp. $3.50.

In this edition, which includes the proceedings of the 1941 Public Works Congress, appear many articles particularly pertinent now, such as "Public Works Problems in Defense Areas," "The Army Construction Program and Municipal Cooperation," "Public Works in the Post Defense Period," "Progress in Airport Development," "More About the Parking Problem" and "Highway Transportation In Wartime." The great variety of these and the other articles, written by men practicing professionally throughout the nation, assures the usefulness of this volume.



PLANNING AND ZONING COMMISSIONS IN

CUMBERLAND AND DAUPHIN COUNTIES

④ CITIES AND BOROUGHS
▧ TOWNSHIPS
▨ AREA INCLUDING MINOR CIVIL DIVISIONS ACTIVE IN THE HARRISBURG REGIONAL PLANNING COMMISSION
DAUPHIN COUNTY
CUMBERLAND COUNTY
1
2
3
4
5
6
7
8
9
10
11
12

CUMBERLAND COUNTY

		Key
1.	**Camp Hill**—Borough	P & Z
2.	Carlisle—Borough	P
3.	**Lemoyne**—Borough	P
4.	**Mechanicsburg**—Borough	P
5.	**New Cumberland**—Borough	P
6.	Shiremanstown—Borough	P
7.	**West Fairview**—Borough	P
8.	**Wormleysburg**—Borough	P
9.	**East Pennsboro**—2nd Cl. Twp.	Z
	Hampden—2nd Cl. Twp.	
	Lower Allen—2nd Cl. Twp.	

DAUPHIN COUNTY

		Key
10.	**Harrisburg**—City	P & Z
11.	Highspire—Borough	P
12.	Paxtang—Borough	Z
	Penbrook—Borough	
	Lower Paxton—2nd Cl. Twp.	
	Susquehanna—2nd Cl. Twp.	
	Swatara—1st Cl. Twp.	

P—Planning Z—Zoning P & Z—Planning and Zoning

Communities appearing in gothic type are participating in the Harrisburg Regional Planning Commisson.

Planning and Zoning Commissions In Pennsylvania

REGIONAL PLANNING COMMISSION

Harrisburg Regional Planning Commission

Counties	Cumberland*	Dauphin*
City	Harrisburg	
Boroughs	Camp Hill	Lemoyne
	Mechanicsburg	New Cumberland
	Paxtang	Penbrook
	West Fairview	Wormleysburg
Township—1st Cl.	Swatara	
Townships—2nd Cl.	East Pennsboro	Hampden
	Lower Allen	Lower Paxton
	Susquehanna	

COUNTY PLANNING AND ZONING COMMISSIONS*

Allegheny—P	Bradford—P & Z
Crawford—P & Z	

PLANNING AND ZONING COMMISSIONS IN MINOR CIVIL DIVISIONS

Allegheny County

Cities	Clairton—P	McKeesport—P & Z
	Pittsburgh—P & Z	
Boroughs	Aspinwall—Z	Bellevue—Z
	Ben Avon—P & Z	Ben Avon Heights—Z
	Brackenridge—P	Brentwood—P & Z
	Castle Shannon—Z	Churchill—Z
	Crafton—Z	Dormont—Z
	East McKeesport—P	Edgewood—Z
	Edgeworth—Z	Emsworth—Z
	Etna—Z	Forest Hills—Z
	Fox Chapel—P & Z	Glassport—Z
	Greentree—P & Z	Ingram—P & Z
	Leetsdale—Z	Liberty—P
	Munhall—P	North Braddock—Z
	Oakmont—Z	Osborne—Z
	Rosslyn Farms—Z	Sewickley—Z
	Sewickley Heights—Z	Swissvale—Z
	Tarentum—P	Thornburg—Z
	West View—Z	Wilkinsburg—Z
Townships—1st Cl.	Baldwin—Z	Braddock—Z
	Mifflin—P & Z	Mt. Lebanon—Z
	Neville—P & Z	Penn—Z
	Ross—Z	Shaler—Z
Townships—2nd Cl.	Hampton—Z	Moon—Z

Beaver County

Boroughs	Midland—Z	Monaca—Z
	Rochester—Z	

Berks County

City	Reading—P	
Boroughs	West Lawn—Z	Wyomissing—P
	Wyomissing Hills—P & Z	

---

* Cumberland and Dauphin Counties are participants in the support of the Harrisburg Regional Planning Commission.

Blair County

City	Altoona—P & Z	

Bradford County

Borough	Sayre—Z	

Bucks County

Boroughs	Doylestown—P & Z	Morrisville—Z
	New Hope—P & Z	Sellersville—Z
Townships—2nd Cl.	Lower Makefield—Z	Upper Southampton—Z

Butler County

City	Butler—P & Z	

Cambria County

City	Johnstown—P & Z	
Borough	Westmont—Z	

Carbon County

Borough	Palmerton—Z	

Centre County

Boroughs	Bellefonte—Z	State College—P & Z

Chester County

City	Coatesville—P & Z	
Boroughs	Downington—P & Z	Phoenixville—Z
	West Chester—P & Z	
Townships—2nd Cl.	East Bradford—Z	Tredyffrin—Z
	West Goshen—Z	

Clearfield County

City	DuBois—P	

Clinton County

City	Lock Haven—P	

Crawford County

City	Meadville—P	

Cumberland County

Boroughs	Camp Hill—P & Z	Carlisle—P
	Lemoyne—P	Mechanicsburg—P
	New Cumberland—P	Shiresmanstown—P
	West Fairview—P	Wormleysburg—P
Township—2nd Cl.	East Pennsboro—Z	

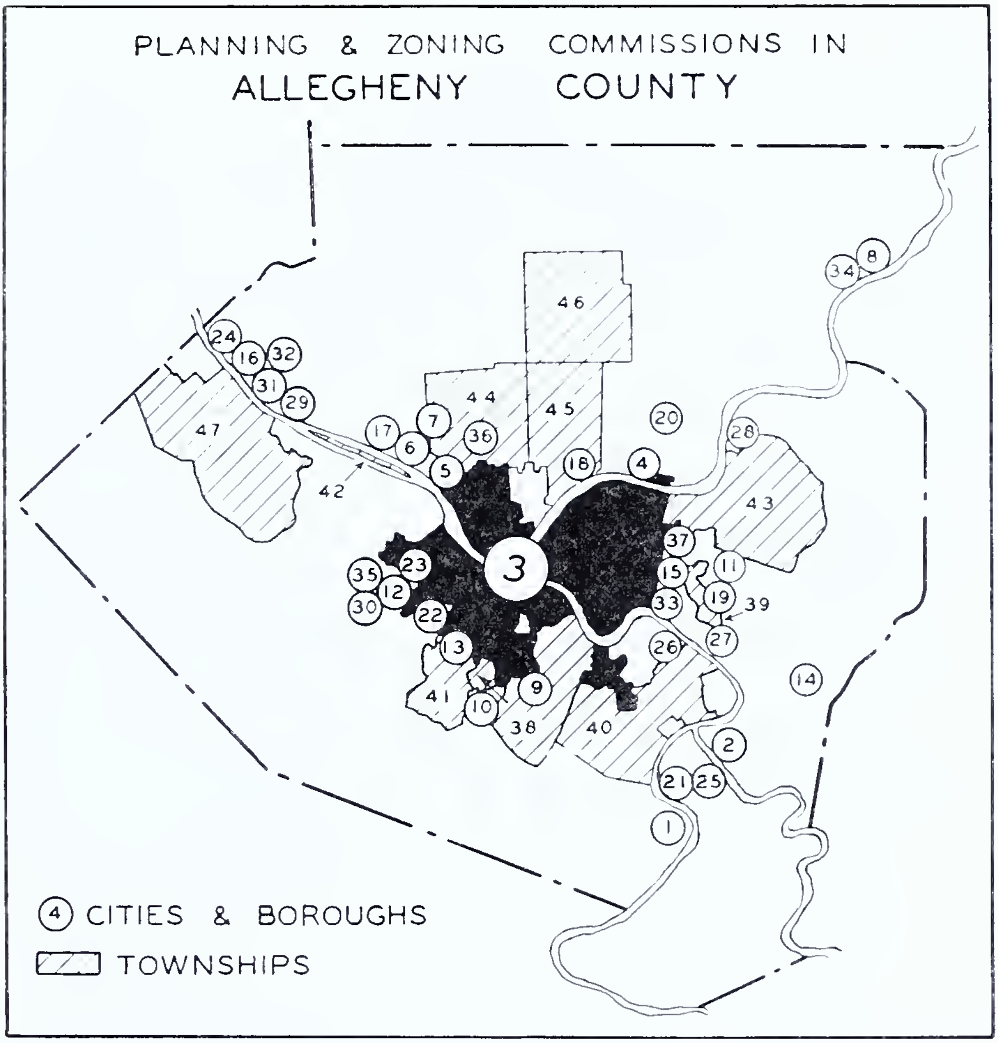
Dauphin County

City	Harrisburg—P	
Boroughs	Highspire—P	Paxtang—Z

Delaware County

City	Chester—P & Z	
Boroughs	Aldan—Z	Colwyn—Z
	East Lansdowne—Z	Folcroft—Z
	Lansdowne—Z	Media—Z
	Morton—Z	Norwood—Z
	Prospect Park—Z	Ridley Park—P & Z
	Sharon Hill—Z	Swarthmore—Z
	Yeadon—Z	
Townships—1st Cl.	Haverford—P & Z	Nether Providence—Z
	Radnor—Z	Ridley—P & Z
	Springfield—Z	Upper Darby—Z
Townships—2nd Cl.	Marple—Z	Newton—Z
	Thornbury—Z	Upper Providence—Z

PLANNING & ZONING COMMISSIONS IN ALLEGHENY COUNTY



KEY

CITIES

1.	Clairton	P
2.	McKeesport	P & Z
3.	Pittsburgh	P & Z

BOROUGHS

4.	Aspinwall	Z
5.	Bellevue	Z
6.	Ben Avon	P & Z
7.	Ben Avon Heights	Z
8.	Brackenridge	P
9.	Brentwood	P & Z
10.	Castle Shannon	Z
11.	Churchill	Z
12.	Crafton	Z
13.	Dormont	Z
14.	East McKeesport	P
15.	Edgewood	Z
16.	Edgeworth	Z
17.	Emsworth	Z
18.	Etna	Z
19.	Forest Hills	Z
20.	Fox Chapel	P & Z
21.	Glassport	Z
22.	Greentree	P & Z
23.	Ingram	P & Z
24.	Leetsdale	Z
25.	Liberty	P
26.	Munhall	P
27.	North Braddock	Z
28.	Oakmont	Z
29.	Osborne	Z
30.	Rosslyn Farms	Z
31.	Sewickley	Z
32.	Sewickley Heights	Z
33.	Swissvale	Z
34.	Tarentum	P
35.	Thornburg	Z
36.	West View	Z
37.	Wilkensburg	Z

TOWNSHIPS, FIRST CLASS

38.	Baldwin	Z
39.	Braddock	Z
40.	Mifflin	P & Z
41.	Mt. Lebanon	Z
42.	Neville	P & Z
43.	Penn	Z
44.	Ross	Z
45.	Shaler	Z

TOWNSHIPS, SECOND CLASS

46.	Hampton	Z
47.	Moon	Z

Erie County

City	Erie—P & Z	

Fayette County

Cities	Connellsville—P & Z	Uniontown—P & Z

Lackawanna County

Cities	Carbondale—P	Scranton—P & Z

Lancaster County

City	Lancaster—P	
Boroughs	Christiana—Z	Manheim—P
Township—2nd Cl.	Lancaster—Z	
	Manheim—Z	

Lawrence County

City	New Castle—P & Z	
Borough	Ellwood City—P & Z	

Lehigh County

City	Allentown—P	
Borough	Emmaus—P	
Township—1st Cl.	Whitehall—P	

Luzerne County

Cities	Hazleton—P	Wilkes-Barre—P & Z
Boroughs	Forty Fort—P	Freeland—P & Z
	Kingston—Z	West Pittston—P

Lycoming County

City	Williamsport—P & Z	
Boroughs	Picture Rocks—P	South Williamsport—Z

McKean County

City	Bradford—P & Z	

Mercer County

Cities	Farrell—P	Sharon—P
Borough	Grove City	

Montgomery County

Boroughs	Ambler—P & Z	Hatboro—Z
	Narberth—P & Z	Norristown—Z
	Pottstown—P	
Townships—1st Cl.	Abington—Z	Cheltenham—Z
	Lower Merion—P & Z	Plymouth—Z
	Springfield—Z	Upper Moreland—Z
	West Norriton—Z	
Townships—2nd Cl.	Horsham—Z	Lower Providence—Z
	Upper Dublin—Z	White Marsh—Z

Northampton County

Cities	Bethlehem—P & Z	Easton—P & Z
Borough	Hellertown—P	

Northumberland County

City	Sunbury—P	

Philadelphia County

City	Philadelphia—P & Z	

Schuylkill County

City	Pottsville—P	

Venango County

Cities	Franklin—P	Oil City—P & Z

Warren County

Borough	Warren—Z	

Washington County

City	Monongahela—P & Z	
Boroughs	Charleroi—P	North Charleroi—P

Westmoreland County

Cities	Greensburg—P	Monessen—P
Boroughs	Oklahoma—Z	Trafford—P & Z

York County

City	York—P	

Recent Planning and Zoning Activities

Manheim Township. Public hearings were held on June 11 and 12 by the Zoning Commission of Manheim Township, which is the Township which partially surrounds the City of Lancaster. These public hearings were outstanding in that every expression of opinion by residents of the Township was in favor of the principle of zoning. The principal criticisms of the ordinance were that in some respects it was not sufficiently restrictive. It is anticipated that the final public hearing by the Board of Supervisors will be held in the near future and that enactment of the ordinance will follow shortly.

Beaver County. A plan for the organization of a Regional Planning Commission in Beaver County was submitted to the County Commissioners on June 23rd by the Citizens Planning Council of Beaver County. This plan of organization, modeled after that of the Harrisburg Regional Planning Commission, has already received the support and approval of numerous municipalities within the area and of the County Commissioners themselves.

Pittsburgh, Pennsylvania. The Pittsburgh Regional Planning Commission is at present engaged, in cooperation with the Committee for Conservation and Vital War Transportation in the Pittsburgh Region, in dealing with the problem of obtaining transportation for defense workers. The Metropolitan Improvement Program, composed of needed public works in Pittsburgh and its environs, has necessarily become a post-war program in so far as initiation of new projects is concerned. Because of the present-day congestion in industrial cities, that part of the Planning Association's program dealing with mass transportation has now become its most important activity. Under the direction of the Association, W. S. Menden and Associates prepared a study on Pittsburgh mass transportation which includes suggestions for the elimination of on-street parking to reduce Saturday peak hour traffic congestion and the staggering of time for the beginning and stopping of work in the Pittsburgh Triangle. These suggestions have since been carried into effect and have resulted in a considerable reduction in traffic congestion in the Pittsburgh downtown area. The Regional Planning Association is engaged in further studies as to needs of post-war public works to improve transportation and develop regional facilities in Allegheny County.

Erie, Pennsylvania. The City Planning Commission of the City of Erie has been largely concerned during the past year with housing development. Plans have been prepared for a temporary project housing 725 families in three, four, and six-unit buildings which will be removed at the close of the war. Vacant lots throughout the city, which were laid out in dimensions unsuitable for housing uses, have been grouped and re-planned wherever possible, to enable them to be used in housing developments. The City Planning Commission of Erie prepares all applications for building permits to make certain that all regulations as provided in the zoning ordinance are strictly complied with. An official house number map has been prepared under the direction of the City Council, and the Planning Commission has been empowered to assign all future house numbers to avoid conflict and confusion which had become serious in some parts of the city.

Harrisburg, Pennsylvania. The Harrisburg Regional Planning Commission is now engaged on a three-fold program which includes providing aid to local units of government in critical administrative problems, a campaign of publicity and action in regard to the nature and solution of local problems, and the consideration of such immediate regional activities as those of workers' transportation and the preparing of post-war projects for public works. Work is being carried out on local planning problems for New Cumberland, Lemoyne, Camp Hill, Wormleysburg, West Fairview, Paxtang, East Pennsboro and Susquehanna Townships. These problems involve zoning, base maps, housing, subdivision advice, street renaming and renumbering, annexation, park and playground developments and research into land subdivision, with the object of preparation of a standard form of rules and regulations to be adopted by local planning commissions in this area. The over-all regional studies have to do with the preparation of base maps and framing of projects for consideration by the Commission in regard to post-war public works construction. These projects will be broken down into the following headings: new highway construction and opening up and widening of streets within the various city limits connecting with these highways, new bridges, housing, sanitation and water supply, flood control, transportation including suggested new terminals, and park and recreational projects for each municipality. The Commission is also represented on the War Transportation Committee of the Harrisburg Area, through its President, Mr. Frank A. Robbins, Jr. This Committee is meeting weekly and will make constructive suggestions having to do with methods of avoiding a critical transportation problem in this area.

Union City. Thirty-nine students in the Senior Class of the Union City High School have, in their class in Sociology, prepared a study entitled "Community Evaluation." Groups of two to four students reported the results of their investigations under the following headings: Identification, Resources, Population, Utilization of Resources, Wealth Created and Distributed, Standards of Living, Social Control, Public Services, Social Associations, Education, Religion, Health, Recreation, Family Living, and Welfare. Studies such as this not only provide the persons gathering the material with a clearer idea of what a community is, but also furnish a factual basis for further analysis in a program of community self-appraisal.

"POSTWAR PLANNING IN THE UNITED STATES"—George B. Galloway, The Twentieth Century Fund, Inc., New York, 1942. 158 pp.

Winning the peace as well as winning the war is the work of all of us. This is evidenced by the great variety of governmental and private agencies engaged in studying the problems of postwar America. Of more than one hundred agencies already reporting their activities in this field, along with their personnel and publication, the following few are a sample of this variety: American Association of University Women, Carnegie Endowment for International Peace, Federal Council of Churches, General Electric Company, Liberty Bank of Buffalo, National Resources Planning Board, Rotary International, State Department, and University of California Institutes for Social Science Research.

This volume may serve as a directory whereby individual agencies can relate their efforts to those of other groups active in similar portions of the field of postwar planning in the United States.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols, 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.
*Air Photography, November, 1940.
*Defense Problems, January-March, 1941.
*Post Defense Problems, April-June, 1941.
Index of Publications, August, 1941.
*Community Self-Appraisal, September-October, 1941.
*Self Appraisal for Increased Production, November, 1941-January, 1942.
*Community Self Appraisal (Revised Edition), April, 1942.
*Comparative County Data, May, 1942.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

PENNSYLVANIA PLANNING

DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

OCTOBER 1942

POPULATION

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COMMONWEALTH OF PENNSYLVANIA

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▼

PENNSYLVANIA DEPARTMENT OF COMMERCE

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

Vol. 8 OCTOBER, 1942 No. 6

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Pennsylvania Life Expectancy 31

Pennsylvania's Future Population 35

Editorial

¶ In the midst of a great and critical war, population is the vital element of national power.

¶ Steel, rubber, tanks, planes and battleships are of themselves inert and ineffective; only the men and women of the nation can create the essentials of victory.

¶ It is for our people that the war is fought.

¶ It is by our people that the war must be won.

¶ We analyze our resources of steel and iron, of rubber, tin, copper, coal and oil.

¶ It is also essential to understand the nature of our resources in men and women.

¶ No war-time picture of our strength—no analysis of our post-war resources and problems—can rest safely on any other foundation.

The Population of Pennsylvania

The 1940 census recorded 9,900,180 persons as residents of Pennsylvania's 45,302 square miles of territory. Behind the fact recorded in these numbers lies one more chapter in that long story of the development of the people and the culture of this whole State, a story which began in the days of the first settlement and goes on into a future of perhaps many hundreds of thousands of years. Looked at in this way, the history of any American state will be seen as the mere beginning of the long chain of human development which is certain to be formed on this continent.

In this respect the story of population in Pennsylvania is greatly different from a similar history or record made in any of the nations of Europe where men have already struggled to adapt their living to the resources of their land for many thousands of years.

The mere facts as to the number of people now living in Pennsylvania are, however, among the most significant items in our population record. How many people inhabit a given area in a country where population is mobile and not restricted as to its dwelling place is a resultant of many factors. Among these factors are, of course, the resources of the land on which they live, the productivity of its agriculture, the activity of its industries, the richness of its mineral wealth and the healthfulness of its climate.

Standards of living also bear on the number of persons dwelling in any given area. The higher those standards rise, the lower the birth rate tends to fall and that is a fact which appears to go back through all the records of human history. So far as population is concerned, great cities are sterile areas which are rarely capable of reproducing themselves. This was probably true of Imperial Rome. It is true today of London, Paris, Berlin, Vienna and of the great cities of our own country. Cities import population, rural areas export population. That is the normal course of social history.

In the United States during all the period of our development from a primarily agricultural to a primarily manufacturing nation, there has been recorded in our population figures a slow but gradual decline in the proportion of agricultural workers, a rapid increase in the proportion of industrial workers, and finally a very large increase in the number of service and professional workers. This later development may be said to mark the third stage in our occupational pattern and the third phase of our population and social history.

These changes were made possible by the increasing productivity of both agriculture and manufacturing, so that, through the course of the hundred years from 1820 to 1920, the proportion of our population employed in the production of foodstuffs and manufactured goods slowly declined and the number employed in distributing these goods, in manning our transportation system, in supplying the thousands of types of personal professional services which add to the comforts of life, had increased with no loss whatever to our capacity for production of the primary needs of life.

American cities increased in number and in population during all that hundred year period. Their growth was stupendous, something unparalleled in the whole history of the world, and it was not until the decade between 1920 and 1930 that any change could be observed in this long process, first, of the settlement of our land and second, of the concentration of its population around great trading and industrial areas.

The period of the first World War from 1910 to 1920 was marked by an extreme and final intensity of concentration which is well illustrated in the population growth maps published in Pennsylvania Planning in December, 1939.

Pennsylvania was one of the earliest settled of all our larger eastern states and its history is typical of changes which have occurred later on in many of the newer areas in the west.

During the nineteenth century, population in Pennsylvania followed the lines of industrial opportunity in a world transforming itself from agriculture to industry and commerce.

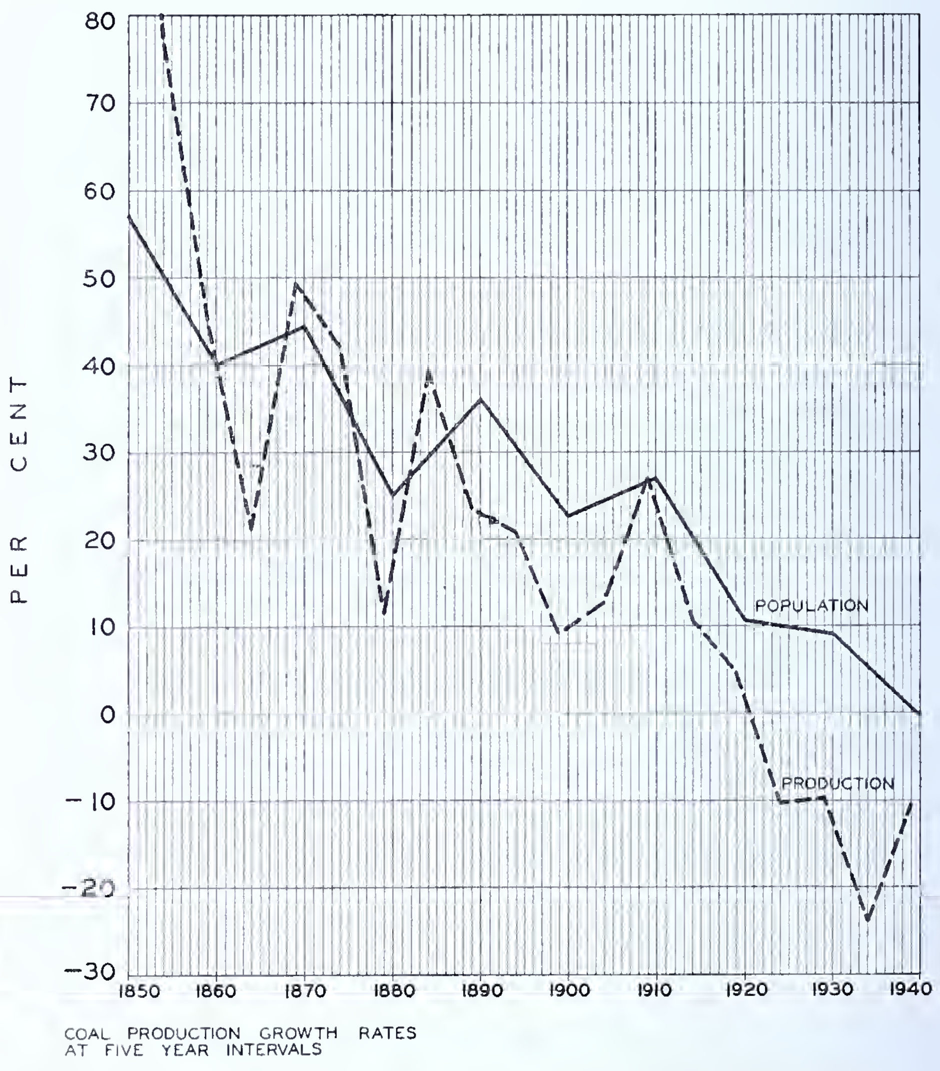
The first wave of settlement which occupied the southeastern counties in our State was almost exclusively agricultural. The second wave of settlement extended this agricultural area into the great forests of the west. Lumbering became an important secondary occupation, since the whole region west of the Delaware Valley was, in early times, an almost unbroken expanse of virgin forest.

From a growth based on lumbering and pioneer farming in the west, the tide of population, in the 1840's, swung back eastward with the development of anthracite as a domestic and industrial fuel, only to move west again with renewed force in the 1870's toward the bituminous coal fields and the large steel industries centering about Pittsburgh. At the same time the great oil boom in western Pennsylvania led to another movement of population into the area centering about Venango and McKean Counties.

From 1870 to 1910, the development of minor manufacturing centers throughout the State led to many local concentrations of population based on industrial opportunity and to the development in Pennsylvania of a typical form of social structure, that of the small industrial city, so that today a larger part of our State's population lives in small urban communities than in any other State in the Union.

How population growth during this period followed the line of industrial development and responded to the changes in industrial opportunity may be seen from the chart of population growth rates in seven anthracite counties and the percentage change in anthracite production illustrated on page 6.

Between 1930 and 1940, a new and almost unprecedented change took place in the population growth of Pennsylvania as



POPULATION GROWTH RATES IN SEVEN ANTHRACITE COUNTIES AND PERCENTAGE CHANGE IN ANTHRACITE PRODUCTION
1850 — 1940

COAL PRODUCTION GROWTH RATES
AT FIVE YEAR INTERVALS

POPULATION GROWTH RATES
AT TEN YEAR INTERVALS

PENNA. DEPT OF COMMERCE
STATE PLANNING BOARD

PLATE 1

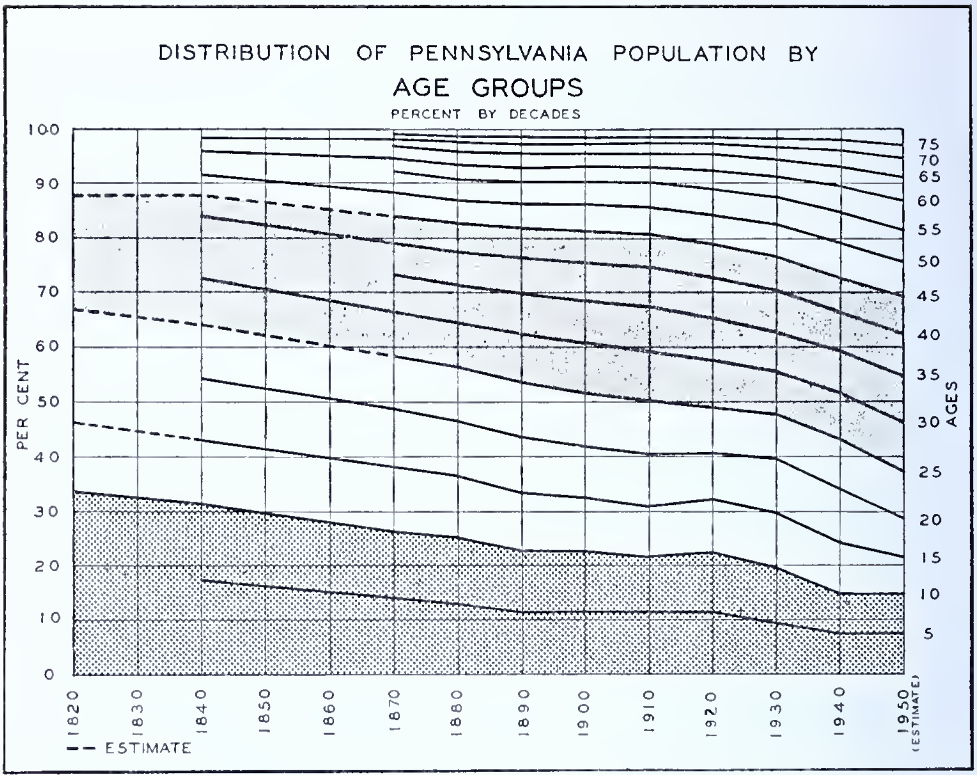
in many other of our eastern and western states. For a long time in that dark decade, industrial opportunity was at a very low ebb. The large concentration of people in our great cities found it very difficult to obtain adequate employment in a period when the industrial production, which had been stimulated by war and by a great post-war boom, suddenly collapsed throughout all the civilized world. Under these circumstances there ensued a reverse movement of population, a drift back to rural areas and to small towns which for a while stemmed that great tide of cityward movement which had been flowing for more than a hundred years.

It is obvious that the second World War has again reversed this current and has led to a renewed concentration of population in the industrial centers of our country. Whether this present movement will result in an over-expansion of industrial production, which will in time compel a second movement back to the land, will be one of the graver problems facing our people when the war is ended.

THE AGE OF OUR PEOPLE

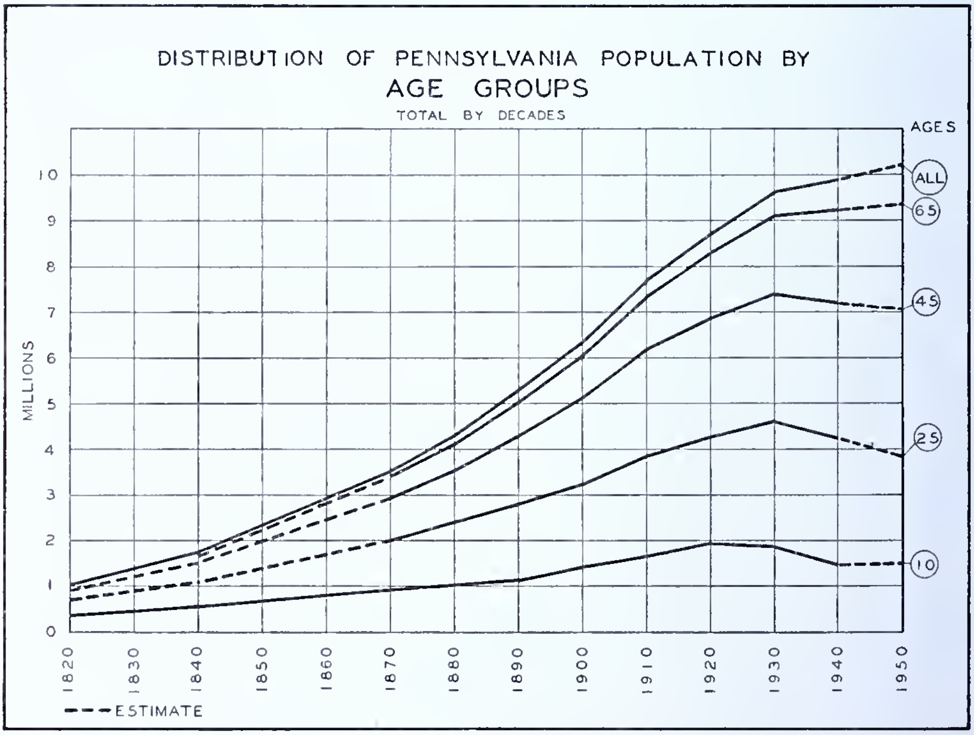
In 1840, 54% of our State's population was under 20 years of age. By 1940, this proportion had declined from more than half of our people to little more than one-third. Of Pennsylvania's 9,900,180 inhabitants in the 1940 census, 3,362,676 were under 20 years of age, while 677,468 were 65 or older. Thus, 4,040,144 of the people of the Commonwealth are below present military age or over the usual age of industrial employment.

In Plate 2, Page 8, is shown the changes in the age distribution of Pennsylvania's population during the past 120 years. These sloping lines which droop downward to the right of the chart record changes of profound significance to the people of our State and of our country. These changes have occurred slowly and almost imperceptibly, but in the past 10 years, they have begun to force themselves upon our attention and it is safe to say that the thinking of the average man has not yet fully digested their reality.



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

PLATE 2



PENNSYLVANIA DEPARTMENT OF COMMERCE STATE PLANNING BOARD

PLATE 3

It is a truism to remark at this time that Pennsylvania's population, like that of all America, has been steadily growing older for more than 100 years. That America, beyond all nations, was a land of youth in the early years of the 19th century is unquestionable. It is very hard for us to realize that youth is no longer the outstanding characteristic of our population.

In 1820, 48% of the people of our State were younger than age 15. In 1940, less than 25% were younger than 15. In 1820, two-thirds of our population were younger than 25. In 1940 only 42% were younger than 25. As the young have grown proportionately few, the old have grown proportionately many.

There are today in the State of Pennsylvania as many men and women older than 55 as there are children age 10 or younger. There are as many over age 40 as there are under age 20. One hundred years ago there were nearly as many children 10 years of age or younger as there were men and women 27 years of age and older. Even in the past 20 years, the proportion of children to older people has greatly declined.

Achieving this change has indeed been a major purpose of all the efforts of our civilization, for it has been attained only through the combined efforts of science and industry in eliminating the needless hardships of existence, in battling against the combined effect of cold, hunger, long hours of labor, and against exhausting toil and the ravages of epidemic disease, so that today, as will be explained more fully in another section of this bulletin, the life expectancy of a Pennsylvania child is nearly 63 years at the hour of his birth and rises to 65 years if he survives the first year of life.

It is inevitable that this triumph of medicine and hygiene would result in a population in which age predominates in a way that has never before been known in the history of the world.

This chart, therefore, records the success of American civilization in the Commonwealth of Pennsylvania. It is a record of which any people should be proud, but there is another side to the picture, a side which is better illustrated in Plate 3, Page 8, where it will be seen that beginning in the year 1920 the total population of children in Pennsylvania under age 10 has actually begun to decline and that the rate of this decline has increased in the past decade.

It is also true that the number of those from 10 to 14, which had increased until 1930, had also begun to decline by the date of the last census, so that the very greatly increasing proportion of numbers in the age group from 25 to 64 and the considerable increase in the age group 65 and over has been accompanied by an actual loss in the number we will have available to make up our future population.

It is obvious that, if the decline in the number of children recorded between 1930 and 1940 should continue in the future, the population of Pennsylvania would inevitably decrease without a large access of immigrants from outside the State.*

An examination of Plate 4, Page 11, in which is recorded the gains and losses in the State's population by age groups between 1930 and 1940, reveals the extent of this loss in the past decade, so far as it concerns the members of our population 14 years old and younger.

The gains made in this decade have been concentrated in two age groups, that between 15 and 34 and that between 40 and extreme old age. While it must be remembered that the facts revealed in Chart 4 record a balance of gains and losses in which migration is an important factor, the meaning of the chart is nevertheless unmistakable.

The first period of large gains corresponds with the very high birth rates recorded for our population from 20 to 30 years ago, births that in actual numbers exceed those of any following years. It is likely that some part of the losses recorded in the age group 35 to 39 is due to the migration of active younger men during the period of the great depression.

The second long period in which our State's numbers have grown extends from age 40 to 75 and upward and records, in

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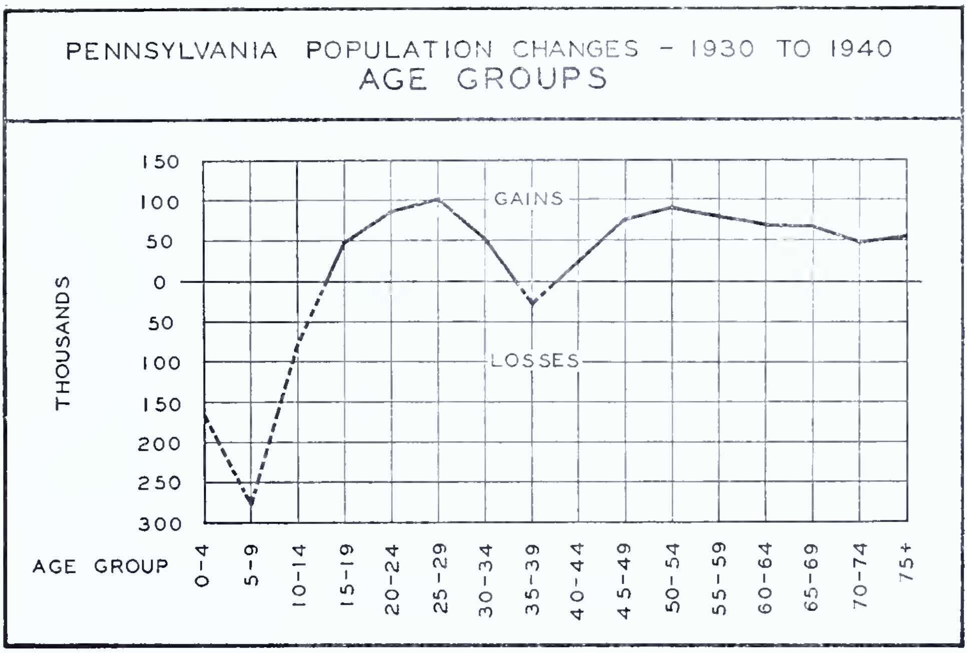
* See, however, pages 34 and 35 as to immediate prospects of population growth.



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

PLATE 4

a large measure, that aging of our population to which reference has already been made.

These facts bear directly upon our war and post war problems in the following ways:

First; the population of men of military age in Pennsylvania and in the Nation as a whole is now at a maximum and at no time in the ensuing 20 years can that number be as great as it is today, on the basis of the size of our present population of those under age 20. This is also true of Great Britain, Germany and most of the nations of Western Europe, in all of which the birth rate and actual number born 20 years ago have never since been equalled. Indeed, this fact may have had much to do with the outbreak of the present war. Industrialism, which provides the physical materials for war, has also involved the concentration of a large part of the population of the industrial nations in those large cities in which the birth rate is far lower than in the less congested areas, so that the rise in industrial power has been accompanied by a decline in the future manpower which could operate the engines of war.

Since a lag of approximately 20 years occurs after a decline in birth rate sets in before the fact is revealed in the numbers of men of military age, the greatly increased industrial activities of the past 20 years resulted in a condition in 1939, 1940, and 1941 in which both manpower and production were at their maximum for all the Western World.

Second; from the population composition illustrated in Plate 3, Page 8, it is obvious that in the post war world more and more of the work of production must be performed by older people if existing levels of production are to be maintained.

Third; the problem of occupation and support for the aged will tend to become more and more acute within the next 10 years, and the necessity will be much more keenly felt for the development of gainful occupations through which the aged can contribute to their own support and do their part to add to the wealth of the world. It is evident that, as the percentage of aged rises in the total population of this State and of the Nation, while the percentage of the young proportionately declines, the problem of finding suitable, useful occupations for older people will become a matter of urgent necessity, if our economic and social life is to be maintained at the present standard of well-being for all of our people.

PENNSYLVANIA'S RACIAL COMPOSITION

Year	Total Population	Percentage Distribution		
		Native White	Foreign-Born	Negro
1850	2,311,786	84.6	13.1	2.3
1860	2,906,215	83.2	14.8	2.0
1870	3,521,951	82.7	15.5	1.9
1880	4,282,891	84.3	13.7	2.0
1890	5,258,113	81.9	16.1	1.4
1900	6,302,115	81.9	15.6	2.5
1910	7,665,111	78.7	18.8	2.5
1920	8,720,017	80.8	15.9	3.3
1930	9,631,350	82.7	12.8	4.5
1940	9,900,180	85.4	9.8	4.7

TABLE 1

Characteristics of Our Population

RACIAL COMPOSITION

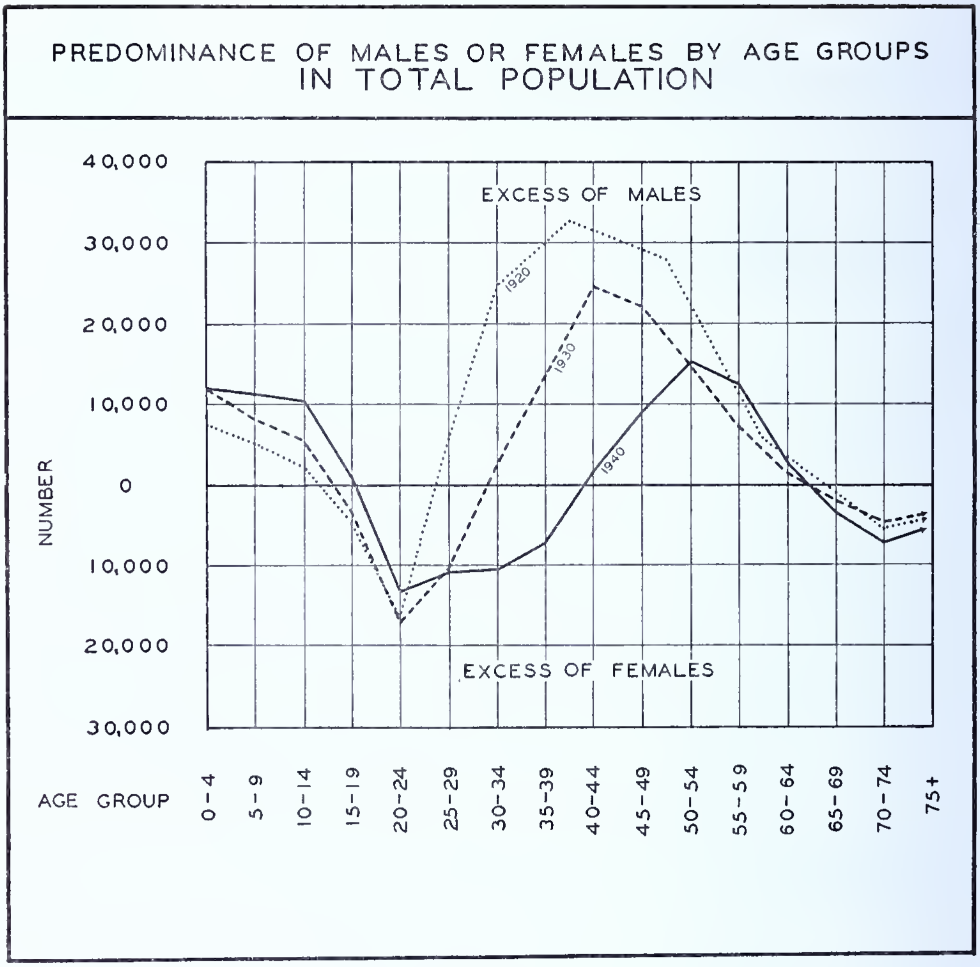
One of the most remarkable facts about Pennsylvania's racial composition is that the proportion of native whites in the State's whole population has remained relatively unchanged in the past 100 years. It will be seen from Table 1, Page 12, that in 1850, 84.6% of the people of Pennsylvania were native white, that 30 years later in 1880, 84.3% were still native white and that in 1940, 85.4% were native white. The large influx of immigrants from Europe and Asia between 1890 and 1920 temporarily disturbed this proportion so that in 1910 the percentage of foreign born in our population had reached its highest recorded point of 18.8%, but is now at the lowest point recorded in the past 10 censual years since 1850, and the total number of foreign born recorded in our population is now lower than at any time in the past 40 years.

On the other hand, from 1900 onward there has been a slow but steady increase in the State's Negro population which now stands at the highest point in our history.

AGE AND SEX

In a State on which such a heavy industrial and military burden has already fallen, and in which that burden is certain to increase, it is important that we should know something of the distribution of our people by age and sex, particularly among that 60% of the population on whom the heaviest duties of both military and civil life are likely to fall.

One of the most interesting, and, in some ways, one of the most important elements of the State's population picture, is consequently the distribution by age and sex which is illustrated



PREDOMINANCE OF MALES OR FEMALES BY AGE GROUPS IN TOTAL POPULATION

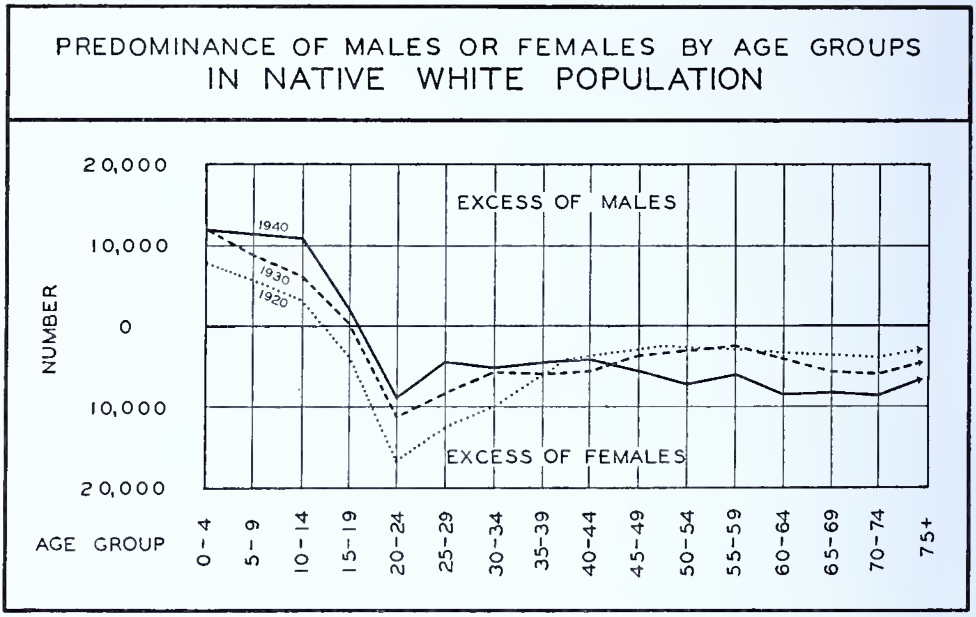
PLATE 5

in Plate 5, above. In the three curves drawn on this chart may be seen the excess of the number of males or females in the State's population by five year age groups in 1920, 1930 and 1940. Some important problems in relation to the State's employment, its future growth, and its supply of men of military age, are revealed by this chart. From the peculiar curves of distribution, it may be seen that there is a definite preponderance of males in the population in all ages up to 14, of females in all ages from 20 to 39, and that males again predominate between the ages of 40 and 64. At age 65, an excess of women again appears in the population, an excess which continues on through the period of old age.

What does the peculiar form of this distribution really mean? Two facts are immediately evident from an examination of Plate 5. In 1920, 1930 and 1940, there is recorded by the census a considerable excess of women over men between the ages of 20 and 24. This is a very remarkable circumstance. If the 1920 figures are correct, it is impossible to determine by the census records from what source this large number of women aged 20 to 24 arose in 1930 and again in 1940. One hesitates to assume that the population peak of women in this age group is rather a matter of choice than of chronology, but a considerable crowding into this age group by those of the female sex who have somewhat passed out of its limits, or not yet attained them, is certainly evidenced by these three successive graphs, as it is in comparable graphs for the United States as a whole.

On the other hand, the excess of men in older age brackets, marked by the peak between 35 and 45 in 1920, between 40 and 44 in 1930, between 50 and 54 in 1940, does seem to move forward much as would be expected from the progress of time.

From Plate 6, Page 16, it will be seen that a very large part of the excess of women in ages 20 to 24 occurs among our native white population and that practically all the excess of males up to age 14 also occurs in this same group. It is obviously impossible to believe that the age group illustrated in 1920 could have become the age group shown in 1930 and that the 1930 age group could have become that shown in 1940 without a very large migration of young women into the State in each successive ten year period. An excess of males in the first 15 years of life is a more normal phenomenon since an average of about five percent more boy babies than girl babies are born every year. This excess of boys born does not, however, normally lead to an excess of males in our later population, as the chart of our native white population illustrates. Due to industrial and other hazards, the expectation of life for a woman is greater than that for a man, and it is normal for



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

PLATE 6

an old and settled population to show a considerably larger number of women in the older age groups than of men.

Plate 7, Page 17, illustrates the age-sex distribution of Pennsylvania's foreign born population. Though a slight excess of women over men does appear in the ages 20 to 24 for the years 1920 and 1930, this group of women appears to grow older in the normal way, and the excess has become largest in the group 30 to 34 in 1940. It will also be seen that the excess of males among the foreign born quite obviously accounts for the remarkable rise in our male population shown in the graph on Plate 5. We thus begin to understand a little better that Pennsylvania's population distribution by age and sex, as illustrated in Plate 5, has been largely affected by the presence in our population of a large number of foreign born males who represent the immigrants coming to our shores up to the period of the first World War.

This group of foreign born males, largest in number in 1920, has successively aged since the period when immigration was severely restricted, so that the graph on Plate 7 represents a receding wave in which, under normal conditions, the peak in

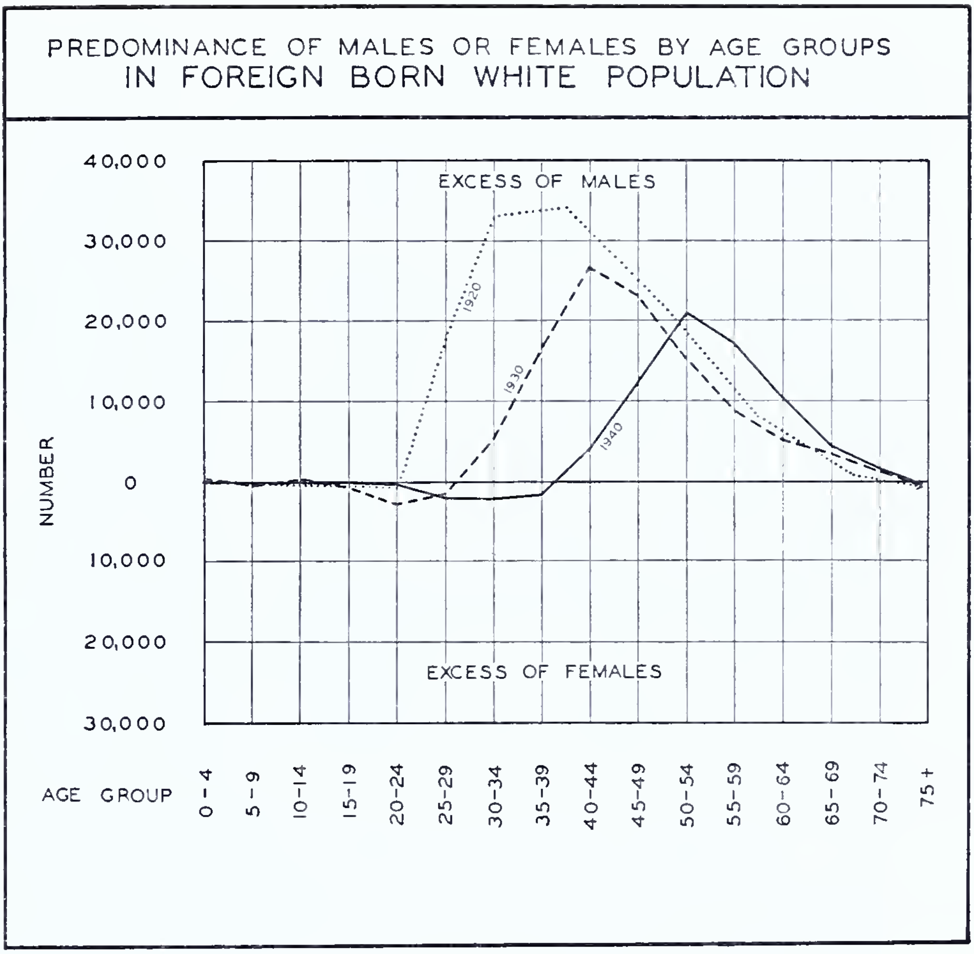
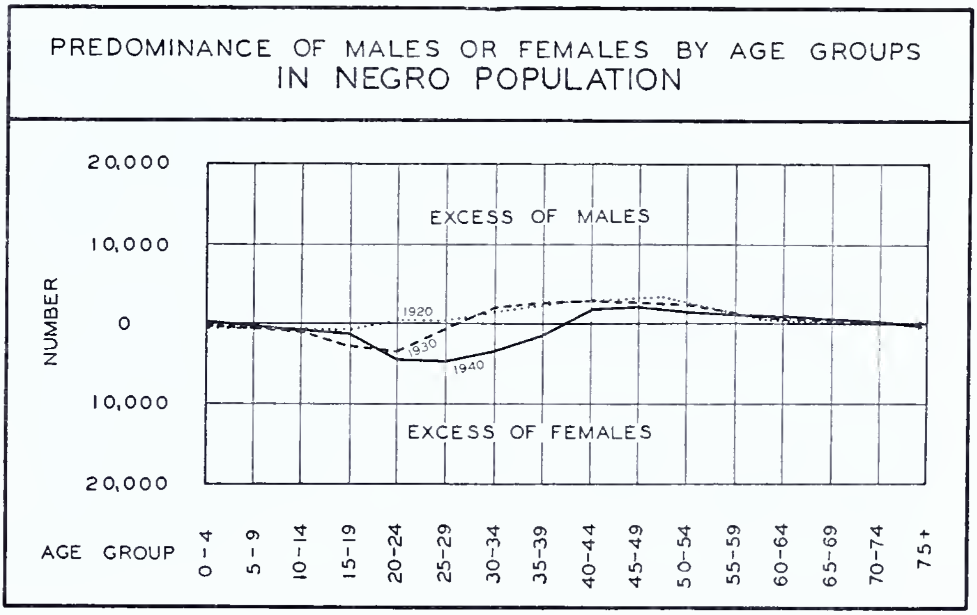


PLATE 7



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

PLATE 8

1950 at age 60-64 will be considerably below the 1940 peak at age 50-54 shown in our chart. If immigration continues to be restricted in the post-war years, the final distribution of Pennsylvania's population by age and sex will more nearly resemble that in Plate 6 than any other in this series of charts.

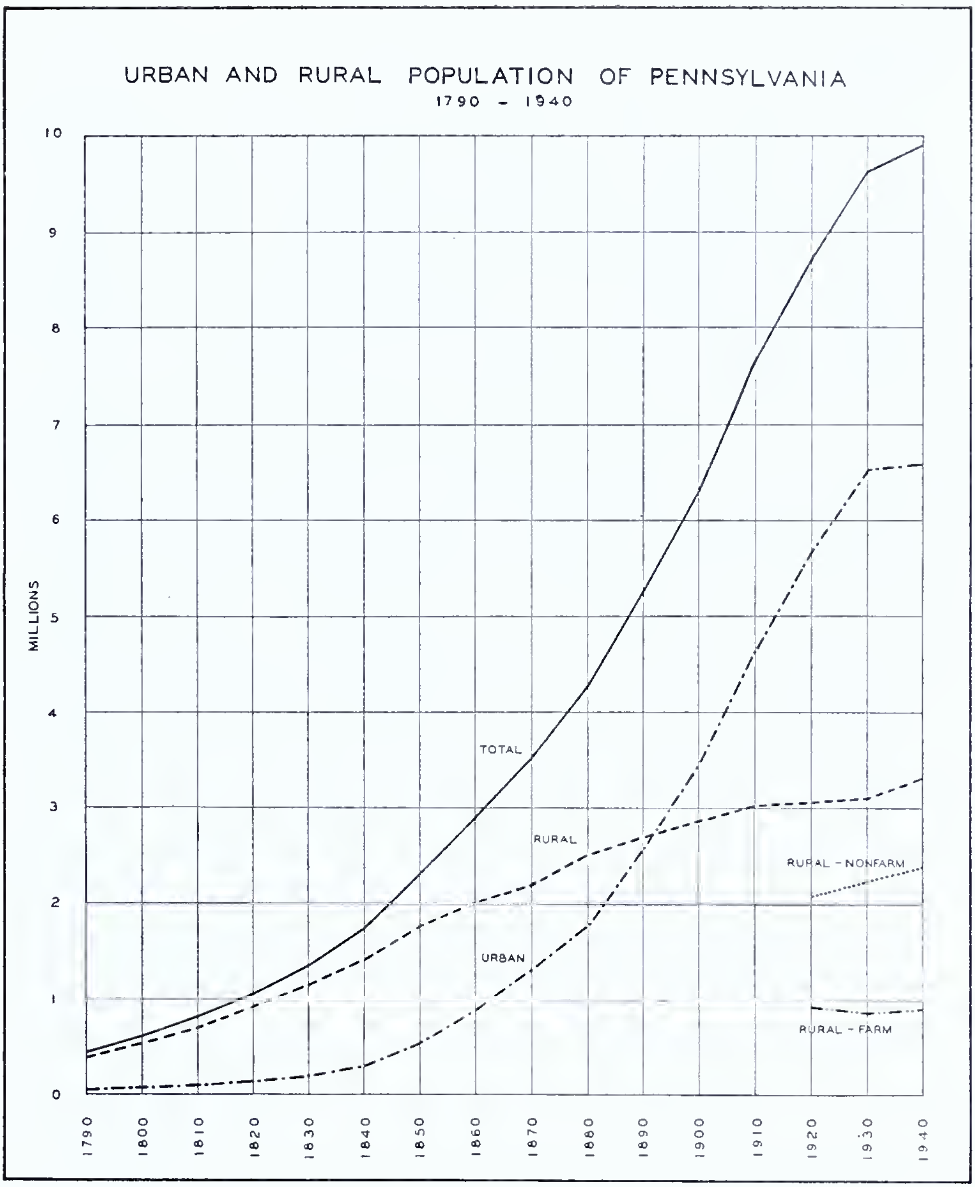
In Plate 8, the age and sex distribution in our Negro population is also illustrated. Here, there is evidence of a continuous migration into the State of young Negro women and of older Negro men, but evidence as to any artificial distortion of the census data is less evident among our Negro population than among our native whites.

It will be clear from these data that Pennsylvania, as well as the United States as a whole, must anticipate that a population which is today on the average evenly distributed as regards the sexes will in the future become increasingly female in composition, precisely as has that of other older countries whose population is not constantly recruited by male immigrants.

URBAN AND RURAL POPULATION

In Plate 9, Page 19, is shown the remarkable transformation which has taken place in the State's urban and rural population throughout its history, as well as the growth in the total population of Pennsylvania for the past 150 years.

In 1790, 89.8% of our population was rural. In the 150 ensuing years the proportion of urban to rural inhabitants, which was 1 to 9 in 1790, had become 2 to 1 in 1940 so that today two-thirds of the State's population dwells in cities or other incorporated communities and only one-third are rural. In actual fact this change, so far as it represents a rise in the importance of industrial areas and of industrial and commercial workers in the population, is even greater than would appear from such figures. In 1790, practically all dwellers in rural territory in Pennsylvania were farmers, or farm workers and their families, but with the development of modern automotive transportation, a large number of industrial and commercial workers in areas surrounding big cities have been en-



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

PLATE 9

abled to dwell in rural territory while working in urban industry or commerce.

The number of rural-farm dwellers in Pennsylvania in 1940 was 905,168 and represents only 9.1% of the State's total population, so that in the course of these 150 years of the history of our Commonwealth, a population in which 9 persons out of every 10 were working and dwelling on farms has become one in which only 1 person out of every 11 is now doing so.

The remarkable fact which must be added to these data is that Pennsylvania's agricultural production has steadily increased throughout all these years and that despite this great decline in the proportion of farm workers, the Keystone State is still among the leading agricultural states in our Nation, and is among the first three or four states in the production of many important classes of farm crops.

It will be noted, from the line on our chart which separates the urban from the rural population, that between 1930 and 1940, the total urban population grew much less rapidly than that of the State as a whole. During the period of the great depression, for the first time in the history of the Commonwealth, a very considerable reverse movement took place from the cities back to the farms, accompanied by a considerably larger growth of population in many of our rural counties than occurred in the decade from 1920 to 1930.

It is far too early in this present ten-year interval to predict that such a tendency will continue. Obviously, the industrial activity stimulated by the present World War has resulted in a renewed concentration of population in our urban areas similar to that which occurred between 1910 and 1920. How long the present war will continue is at present an unknowable factor. It is possible, however, that before 1950 that change in the tide of urban concentration which had already been evident to a small extent in 1930 and had greatly increased by 1940 may again be resumed.

Strong evidence has been developed over the past 10 years that, with adequate transportation and the improved communications of today, certain of the influences which led to the enormous growth of urban communities are no longer operating with the same force as they developed in the past. It may be that for military reasons, as demonstrated in Europe during the present war, the vulnerability of large cities to direct attack from the air may make their continued growth and the further concentration of industry in such communities less desirable than at any time in modern history.

The diffusion of industry throughout the territory of a State, which has in later years become one of the characteristics of Pennsylvania's industrial growth, has many advantages. Where such industries are located with regard to conveniences of transportation and supplies of local raw material, they actively contribute not merely to the prosperity of the limited community in which they are located, but also to that of the whole surrounding area. Conditions of economic competition may be greatly aggravated in the post-war years, and it is possible, and even likely, that we must look forward to the development of an increasingly large number of local units of manufacture and may expect that the population of the great cities of this and other eastern states may begin generally, though gradually, to decline before the end of the next decade.

The only offset to such a tendency would appear to be a well-considered program of municipal planning for the elimination of some of these undesirable features of modern urban life which have developed with the growth of industrialism and of automobile transportation within the past 20 years.

Conditions leading to that type of blight, which affects nearly all great cities and gradually but definitely transforms the fine old neighborhoods of the last generation into areas of slums and lodging houses, must be dealt with if the large cities of our Nation are to maintain their growth and dominance in our social life.

It is obvious when the Nation's great cities must depend for their future development on a population drawn largely from the more prolific rural areas, as they do today, and when the city population, whether because of congestion or industrial pressure becomes relatively sterile, as is also true today, that the growth of large cities depends upon a delicate balance between economic opportunities and social discomfort. Any improvement in the conditions of living in our large urban areas providing more opportunities for outdoor recreation, as well as relief from smoke, noise and congestion, might enable the larger urban communities of our State and Nation to maintain their growth to the benefit of all who enjoy the comforts and conveniences of city life.

PENNSYLVANIA POPULATION IN METROPOLITAN AND OTHER URBAN INDUSTRIAL AREAS

TABLE 2

Metropolitan Areas	Population		Change	
	1930	1940	Actual	Percent
Allentown-Bethlehem-Easton Area*	297,300	301,048	+3,748	+1.3
Altoona Area	114,232	114,094	—138	—0.1
Erie Area	129,817	134,039	+4,222	+3.3
Harrisburg Area	161,672	173,367	+11,695	+7.2
Johnstown Area	147,611	151,781	+4,176	+2.8
Lancaster Area	123,156	132,027	+8,871	+7.2
Philadelphia Area*	2,500,609	2,537,306	+36,697	+1.5
Pittsburgh Area	1,953,668	1,994,060	+40,392	+2.1
Reading Area	170,486	175,355	+4,869	+2.9
Scranton-Wilkes-Barre Area	652,312	629,581	—22,731	—3.5
York Area	87,195	92,627	+5,432	+6.2
Trenton Area*	11,061	11,726	+665	+6.0
Wilmington Area*	864	1,089	+225	+26.0
Youngstown Area*	50,963	50,366	—597	—1.0
Total in Metropolitan Areas	6,400,946	6,498,466	+97,520	+1.5
Industrial Areas				
Beaver Valley Area	156,101	156,945	+844	+0.5
Hazleton Area	83,731	83,334	—397	—0.5
Lower Anthracite Area	308,205	295,832	—12,273	—4.0
Williamsport Area	60,599	60,419	—180	—0.3
Total in Industrial Areas	608,636	596,530	—12,106	—2.0

* Pennsylvania portion.

In Table 2, above, is listed the population and growth in the 10-year interval of Pennsylvania's eleven metropolitan areas, of the Pennsylvania portion of three other such areas in adjoining states, and of four urban-industrial areas. The decade 1930-1940, marked as it was by diminished industrial employment, was not favorable to the continued growth of large cities and their metropolitan areas, so that it is not surprising that

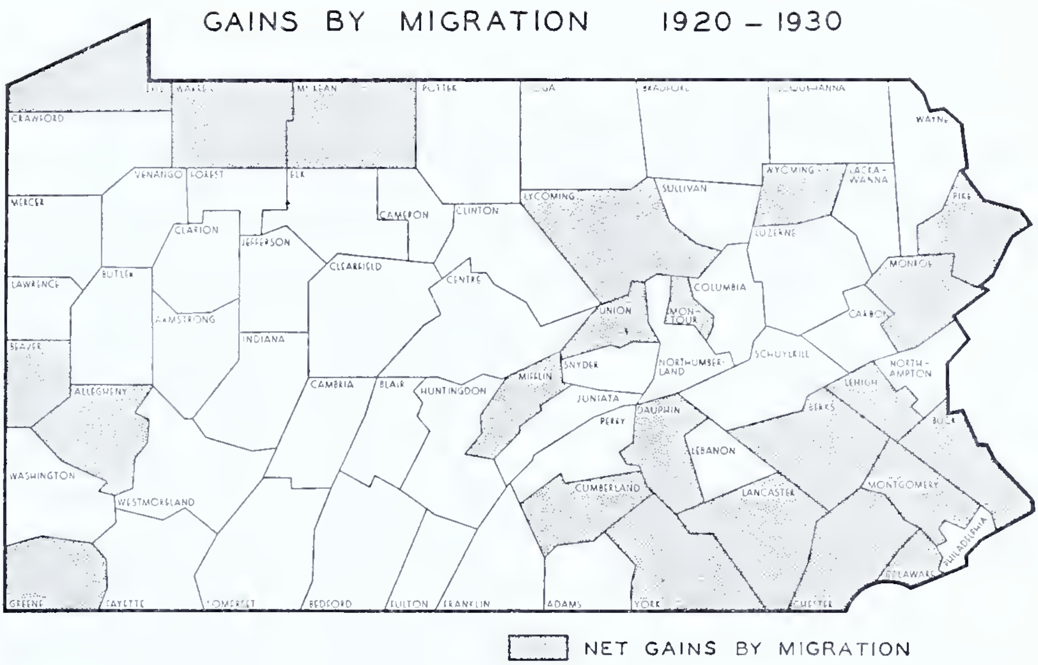


PLATE 10

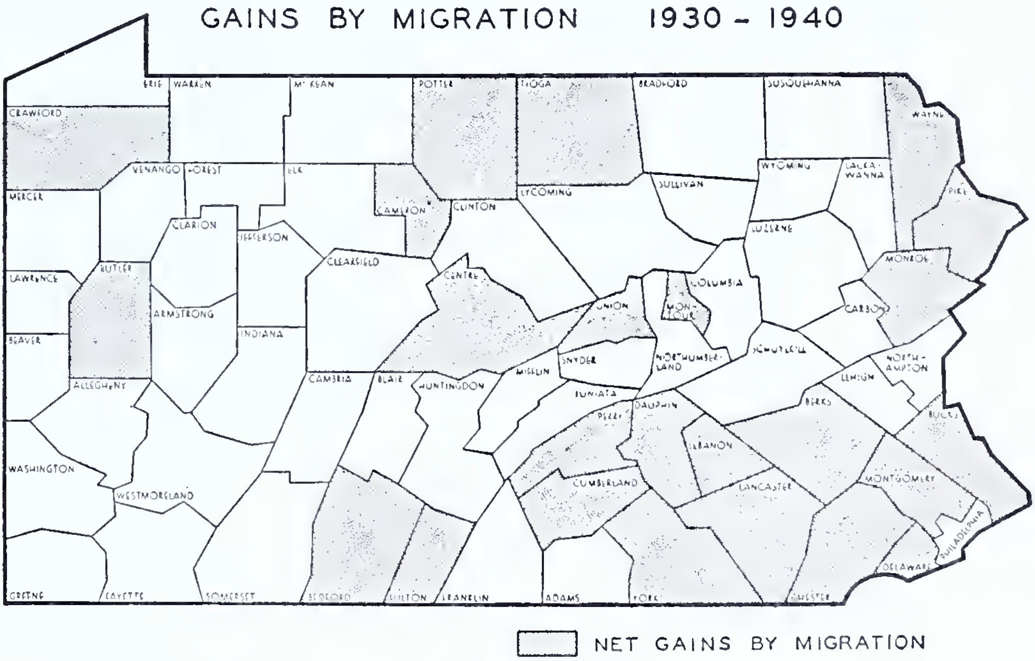


PLATE 11

the percentage of change for all these metropolitan districts registers a growth lower than that of the State as a whole.

The highest growth recorded is that in the boroughs along the Delaware contiguous to Wilmington, Delaware, and in the Harrisburg, Lancaster and York areas, whose diversified manufacture is based on a solid backlog of agricultural prosperity. The greatest losses occurred in the anthracite coal regions due in a large part to that decline in production of anthracite coal which has persisted for more than 20 years, and whose effect on population is illustrated in Plate 1, Page 6.

MIGRATION

In Table 3, Page 25, is set forth, for every county in the State, the natural increase in population for the 10 years between 1930 and 1940, the net change, as recorded by the census figures, for the population growth or decline of each county in the 10-year interval, and the net migration as estimated from the difference between natural increase and recorded change.

This natural increase, as enumerated in Column 5 of the table, is based upon the figures of births and deaths as adjusted for place of residence by the Bureau of Vital Statistics for all years since 1937, and an estimated adjustment applied to the earlier years of the decade.

It will be seen from the State totals, and it is a well-known fact, that Pennsylvania contributes every year a considerable number to the population of other States and has, indeed, been doing so for the past 150 years, for this Commonwealth has done more for the upbuilding of other states and for the peopling of the west of our country than has any other part of the Union.

In Pennsylvania was bred a large part of that rugged pioneer stock which settled the lower Ohio Valley. In the middle of the last century, Pennsylvania contributed a lion's share of the great numbers who moved west toward the gold fields of Cali-

MIGRATION

TABLE 3

Counties	1920-1930*				1930-1940**			
	Natural Increase	Net Migration			Natural Increase	Net Migration		
		Total	% of 1920 Population	Rank		Total	% of 1930 Population	Rank
Adams	4,173	—1,628	—4.71	36	3,433	—1,126	—3.03	38
Allegheny	133,595	+55,007	+4.64	13	73,889	—36,760	—2.67	36
Armstrong	13,700	—9,970	—13.19	49	8,887	—7,098	—8.95	65
Beaver	17,821	+19,620	+17.58	4	14,235	—6,543	—4.39	45
Bedford	4,348	—5,316	—13.89	53	3,332	+168	+.45	20
Berks	15,607	+15,256	+7.60	12	8,697	+1,470	+.63	19
Blair	17,482	—5,976	—4.66	35	8,732	—8,214	—5.87	52
Bradford	2,471	—6,598	—12.41	47	1,586	—10	—.02	25
Bucks	6,672	+7,579	+9.19	9	2,485	+8,503	+8.79	4
Butler	10,259	—7,049	—9.12	41	6,920	+190	+.24	23
Cambria	38,073	—32,766	—16.56	55	24,586	—14,273	—7.03	59
Cameron	637	—1,627	—25.84	63	688	+857	+16.15	1
Carbon	9,365	—8,550	—13.67	50	4,823	—6,468	—10.21	67
Centre	5,349	—3,359	—7.58	40	4,562	+1,752	+3.78	10
Chester	8,264	+3,245	+2.82	19	7,302	+1,695	+1.34	14
Clarion	4,897	—6,536	—18.07	57	3,894	—15	—.43	30
Clearfield	15,575	—32,084	—31.08	66	9,461	—4,094	—4.72	48
Clinton	4,406	—5,642	—16.81	56	2,595	—357	—1.10	32
Columbia	5,330	—4,876	—10.09	45	2,679	—69	—.14	28
Crawford	2,322	—9	—.01	24	2,609	+6,055	+9.61	3
Cumberland	5,069	+4,589	+7.83	11	4,543	+2,027	+2.97	11
Dauphin	11,418	+697	+.46	22	4,410	+7,769	+4.70	7
Delaware	14,416	+92,764	+53.59	1	11,798	+18,694	+6.67	5
Elk	5,863	—7,413	—21.19	60	3,279	—2,267	—6.78	57
Erie	14,995	+6,746	+4.39	14	9,882	—4,270	—2.44	34
Fayette	33,179	—22,741	—12.09	46	20,613	—18,156	—9.14	66
Forest	577	—2,874	—38.44	67	752	—141	—2.72	37
Franklin	6,190	—3,455	—5.55	37	4,384	—16	—.02	26
Fulton	1,108	—1,494	—15.53	54	1,315	+127	+1.38	13
Greene	4,472	+6,491	+21.07	3	4,432	—1,258	—3.66	39
Huntingdon	4,643	—5,470	—13.73	52	3,779	—964	—2.47	35
Indiana	13,510	—19,025	—23.51	62	8,659	—4,200	—5.57	50
Jefferson	8,748	—18,738	—30.17	65	5,407	—3,431	—6.58	56
Juniata	1,667	—1,806	—12.48	48	1,615	—567	—3.96	41
Lackawanna	31,432	—7,346	—2.57	31	13,443	—22,597	—7.28	60
Lancaster	17,322	+5,763	+3.32	18	13,319	+2,303	+1.17	15
Lawrence	13,634	—1,921	—2.25	29	7,403	—7,784	—8.00	62
Lebanon	6,448	—2,497	—3.95	33	5,275	+263	+.39	21
Lehigh	13,115	+11,677	+7.88	10	7,731	—3,091	—1.77	33
Luzerne	57,454	—3,336	—.85	26	29,628	—33,219	—7.46	61
Lycoming	7,515	+2,806	+3.38	17	4,117	—3,905	—4.18	44
McKean	4,905	+1,328	+2.71	20	3,716	—2,210	—4.01	42
Mercer	10,610	—5,152	—5.49	38	5,793	—4,000	—4.03	43
Mifflin	4,922	+3,974	+12.64	5	4,439	—1,781	—4.42	46
Monroe	1,750	+2,241	+9.22	8	1,236	+280	+.99	17
Montgomery	15,411	+51,083	+25.63	2	13,172	+10,271	+3.86	9
Montour	1,103	+1,540	+10.94	6	312	+637	+4.39	8
Northampton	19,632	—3,834	—2.50	30	9,953	—10,298	—6.08	53
Northumberland	18,449	—12,024	—9.85	43	9,715	—11,332	—8.82	64
Perry	1,998	—3,129	—13.68	51	1,414	+55	+.25	22
Philadelphia	138,720	—11,538	—.63	25	53,400	—73,027	—3.74	40
Pike	54	+719	+10.55	7	106	+75	+1.00	16
Potter	1,325	—4,925	—23.35	61	575	+137	+.78	18
Schuylkill	27,542	—9,791	—4.50	34	12,507	—19,681	—8.36	63
Snyder	2,073	—366	—2.14	28	1,416	—44	—.23	29
Somerset	15,187	—16,535	—20.14	59	9,393	—5,200	—6.44	55
Sullivan	779	—2,800	—29.41	64	603	—598	—6.93	58
Susquehanna	2,516	—3,473	—9.99	44	1,675	—1,588	—4.70	47
Tioga	1,659	—6,906	—18.61	58	1,422	+1,711	+5.39	6
Union	1,324	+294	+1.85	21	694	+2,085	+11.94	2
Venango	5,711	—1,669	—2.82	32	4,400	—3,668	—5.80	51
Warren	1,309	+120	+.30	23	1,593	—257	—.62	31
Washington	28,463	—12,653	—6.69	39	16,598	—10,548	—5.15	49
Wayne	1,273	—288	—1.05	27	1,007	+507	+1.78	12
Westmoreland	47,154	—25,727	—9.40	42	26,769	—18,353	—6.22	54
Wyoming	862	+554	+3.93	16	1,198	—13	—.08	27
York	16,823	+5,791	+4.01	15	10,857	+30	+.17	24
County totals	962,361	—51,028	—.59		554,930	—286,100	—2.97	

* Based on unadjusted figures of births and deaths.
** Based on adjusted figures of births and deaths.

fornia. Throughout its history Pennsylvania has always exported people to the less densely settled parts of our country, and it is safe to say that many of the qualities of enterprise and industry which have become typical of our country are marks of that same heritage which, among those who remained at home, has made the production of the Keystone State so vital now to the national welfare.

Millions of Pennsylvanians have moved west, but many more millions have remained on their own native soil, so that Pennsylvania is today second in total population and first in its number of citizens of native parentage.

In 1790, when the area of the United States was only 892,000 square miles, Pennsylvania occupied 5 percent of the national territory and contained more than 11 percent of the American people. Since that year of the first census, the territory of continental United States has expanded until it now occupies 3,026,789 square miles. Pennsylvania's 45,320 square miles are today only 1.49 percent of the national area, and yet Pennsylvania's population is more than 7½ percent of the nation's total, despite the fact that since 1790 the whole area from the Appalachian Mountains to the Pacific Ocean has been peopled with a native stock to which Pennsylvania has contributed a very large share.

The migration of population into and out of the State and between the various parts of the State is influenced by many considerations. Factors which affect the movement of population change from decade to decade altering the pattern of the State's growth, as well as that of the National growth. As was illustrated in maps published in the May 1942 issue of Pennsylvania Planning, the concentration of population in Pennsylvania through the earlier years of the nineteenth century followed first an agricultural pattern and was afterwards affected by the industrial changes which began with the mining of anthracite coal in our northeast counties.

The industrial growth which characterized the second half of the nineteenth century and the first twenty years of the twentieth century led to a steadily increasing concentration of population in the areas surrounding Philadelphia, Pittsburgh and Erie, and in the decade between 1910 and 1920, during which occurred the first World War, there was recorded the greatest concentration of growth in our population history. In the following 10 years, the first evidences of that dispersion of population which was noted in a preceding section of this Bulletin are definitely shown on the population growth map of the counties of Pennsylvania.

By 1940, as a consequence of the world-wide depression of the preceding 10 years, this dispersive tendency had greatly increased and, between 1930 and 1940, a definite change occurred in the motives which led to the migration of population as compared with the period between 1920 and 1930.

Between 1920 and 1930, as might have been expected from the concentrated industrial activity of that period, migration was largely toward the counties of the highest density and the highest per capita wealth so that between 1920 and 1930, we encountered the anomalous circumstance that where the birth rate was lowest and the number of young children fewest, the population rose most rapidly.

In the decade between 1930 and 1940 the picture had greatly changed. Migratory movements were still a large part of the net growth of many Pennsylvania counties, but these movements were less definitely towards centers of high per capita wealth and high congestion, and much more definitely toward counties of the highest agricultural prosperity. Rural counties gained more by migratory movements during the 10 years from 1930 to 1940 than they had gained at any time in the past fifty.

The movement from 1930 to 1940 was thus, like all previous population movements, a record of the attempt of our people to seek financial and social advantages for themselves, but the advantages sought were of a somewhat different order from those which had been pursued during the previous decade. The movement was toward areas of lower taxation and, in general, away from those congested centers of industrial growth and low birth rate in which competition had become too keen during a period of widespread depression.

It will be seen from Columns 2 and 6 in Table 3 that over a period of 20 years some areas in our State have suffered considerable migration losses while some have experienced rather large gains. Such movements, while frequently undesirable and bringing serious consequences to individuals and to communities, do represent an effort of the people of the State to seek a balance between their needs and their means of livelihood.

A certain amount of migratory loss is not necessarily undesirable to an area of high birth rate, but an excessive migratory loss obviously brings with it a decline in property values and perhaps in labor supply, as well as a decline in industrial or agricultural activity which may become of serious consequence.

Conversely—a moderate migratory gain is a healthy normal condition for every American community properly planned and zoned to conserve its living values and to prevent undue congestion and too unequal a strain on its public facilities. But large and sudden increases such as those now inevitable in many industrial cities bring grave problems of water supply, waste disposal, school and hospital facilities, housing, policing, transportation and traffic regulation which can be solved only through a cooperation of local planning and zoning commissions with all other agencies concerned in the community welfare.

In this year of war it is highly desirable that the authorities of the State should be informed as to the extent to which migration toward areas of war activity has changed the 1940 population picture on which is based our rationing system and our draft quotas.

The only clue immediately available as to migratory movements during the past two years is afforded by the County sugar rationing registrations, since returns from the school census taken in the summer of 1942 are not yet complete.

The sugar registrations of May, 1942, in twenty counties of the State exceeded their total 1940 population. In 44 counties of the State, sugar registrations were below the 1940 population of those counties. In three counties the registration totals are not yet available or are known to be incomplete, one of which is the county of Philadelphia where there is almost certainly a net gain in population since March, 1940. It would not be accurate, however, to conclude from these data that in the period since March, 1940, twenty-one counties in the Commonwealth had gained in population while forty-six had lost as a consequence of migratory movements produced by war industry. This would not be true. It is certain that on the balance between military inductions and natural increase, the civilian population of the entire Commonwealth has declined in the past twenty-one months. In many counties into which there has been a considerable migration, it is likely that, on the balance between men coming into the county to find work, and men inducted in the Army, there has been a net loss in civilian population despite apparent crowding and congestion and the difficulty of incoming workers finding lodging quarters. Many, if not most draftees, are residents of homes which do not normally receive lodgers, so that, in a small city, the departure of a thousand men into military service and the arrival of a thousand men as war workers might well produce an impression of a considerable population increase due to house and lodging shortages and increased demands on public eating facilities when, in fact, no actual increase in civilian population had occurred.

In considering the value of the State sugar registrations as a guide to population movement, certain difficulties at once present themselves. In cases where sugar registration actually exceeds the 1940 population plus the natural increase between January, 1940, and May, 1942, there appears to be definite evidence of a considerable increase in population. On the other hand, a very marked shortage in sugar registrations as compared to the 1940 population may mean migrations out of the county, but it may also mean that a number of the county residents failed to apply for sugar cards, or that the registration returns are incomplete.

In large cities, where a considerable part of the younger working population is located, a population living in rooming houses and eating in public restaurants, it is only reasonable to assume that the presence of this group is not fully represented by the sugar registration figures. Such facts must be considered in interpretating the data now available. However, it may be said with confidence that migration out of the anthracite coal counties, Lackawanna, Luzerne, Schuylkill, and Carbon, has been very heavy, and that movements have occurred out of two additional counties, Northumberland and Berks. In none of these counties have war contracts been placed or war industries established on any scale comparable with their population and labor resources.

There is also evidence that some migration has occurred out of the northern tier counties from Warren to Wayne, that some population movement has occurred out of many of the south-central counties into industrial areas in the southeast and west, and that both Fayette and Green Counties have lost population to industrial areas around Pittsburgh, and in West Virginia and Ohio. On the other hand, distinct gains have occurred in the Erie district, in Crawford and Beaver Counties, in Northampton and Lehigh, in Bucks and Delaware Counties, in Cambria, Dauphin, and Cumberland Counties and in Philadelphia.

In other counties not mentioned in this list, considerable increases or decreases in population may have occurred, though evidence is not now available as to their extent or direction. It must not be forgotten that, in a period of such profound changes as have lately occurred, the estimating of population movements and of present totals is a task of particular difficulty. The balance of births and deaths, and of army enlistments and inductions, and, during this year, a large daily migration from home to work in many parts of the State, greatly confuse the issue. It is obvious, however, that migratory changes in such a period as that which we are now experiencing are likely to conform more closely to the pattern of changes which occurred between 1920 and 1930, the period of high industrial activity, than to the pattern of those which took place between 1930 and 1940, a period of low industrial activity.

In considering the factor of interstate migration alone, it is probable that, during the past two years, Pennsylvania has reversed the general tendency of its population history and is now receiving more people from other states than are leaving Pennsylvania to find work elsewhere.

Because of the great importance of such knowledge from the standpoint of war-labor, military quotas, rationing of available supplies and housing problems, the State Planning Board is undertaking to explore all available sources of data on which a continuous inventory of our changing population picture may be based.

PENNSYLVANIA LIFE EXPECTANCY

One factor of population change which has been frequently mentioned in the preceding sections of this article is that of life expectancy. In Table 4, Page 32, will be found an abridged life table for Pennsylvania for 1940, calculated by the staff of the State Planning Board from the mortality records in the State in 1940 and 1939. This table shows the number of years of life expectancy remaining to each person at birth, age 1, 5, 10, etc., up to age 95. It records the very remarkable improvement made in life expectancy within the past 20 years. Since 1920 the probable length of life of a child born in Pennsylvania has risen from 54.2 years to 62.93 years. Those who survive to age one in Pennsylvania now have a life expectancy of 65.19 years. This rise from the expectancy at birth to the maximum a year later is due to the high mortality in the first year of life which prevails in all countries. In Pennsylvania, this rise was 4.32 years to age 2 in 1920, 2.92 years to age

LIFE EXPECTANCY IN PENNSYLVANIA 1940

TABLE 4

	Pennsylvania				India	China
	Survivors of 100,000 Born Alive,	Life Expectancy				
Age	1940(a)	1940(a)	1930(b)	1920(b)	1931(c)	1929-31(c)
0	100,000	62.93	59.52	54.62	26.74	34.74
1	95,059	65.19	62.44	58.82	34.08	39.99
2	—	—	62.06	58.94	36.37	43.40
5	94,165	61.87	59.78	57.18	37.79	47.27
10	93,643	57.20	55.30	52.92	35.00	46.53
15	93,199	52.46	50.66	48.50	—	43.37
20	92,535	47.81	45.69	43.90	28.33	40.41
25	91,614	43.27	41.88	40.52	—	37.35
30	90,507	38.77	37.63	36.79	22.95	34.28
35	89,119	34.33	33.40	33.03	—	30.91
40	87,226	30.02	29.26	29.20	18.42	27.45
45	84,581	25.87	25.28	25.35	—	24.06
50	80,824	21.95	21.49	21.54	14.48	20.65
55	75,455	18.33	17.94	18.04	—	17.41
60	68,182	15.00	14.68	14.77	10.53	14.71
65	58,677	12.01	11.72	11.76	—	12.22
70	47,159	9.32	9.12	9.18	6.55	10.05
75	34,040	6.93	6.92	6.96	—	8.22
80	19,800	5.14	5.16	5.11	3.19	6.44
85	8,725	3.69	3.84	3.50	—	4.59
90	2,300	2.84	2.83	2.20	1.15	2.83
95	450	2.02	2.06	—	—	—

(a) From Pennsylvania State Planning Board.
(b) From U. S. Census Bureau.
(c) From Millbank Foundation.

1 in 1930, and 2.26 years to age 1 in 1940. The diminution of this rise and its quicker achievement in recent years (at age 1 instead of at age 2) reflects the reduction in the high mortality immediately after birth.

One rather surprising fact brought out by all recent life expectancy tables is the lack of change from decade to decade in the upper ages. Between 1920 and 1940, life expectancy at birth increased by approximately eight years. Beyond age 40, however, the improvement between 1920 and 1940 is less than eight months in expectancy, and at age 75 the life expectancy in 1920 was slightly higher than that of twenty years later. This lack of change in the expectancy of older groups, when substantial increases are evident in the younger age groups, indicates that a large part of the effect of our efforts to im-

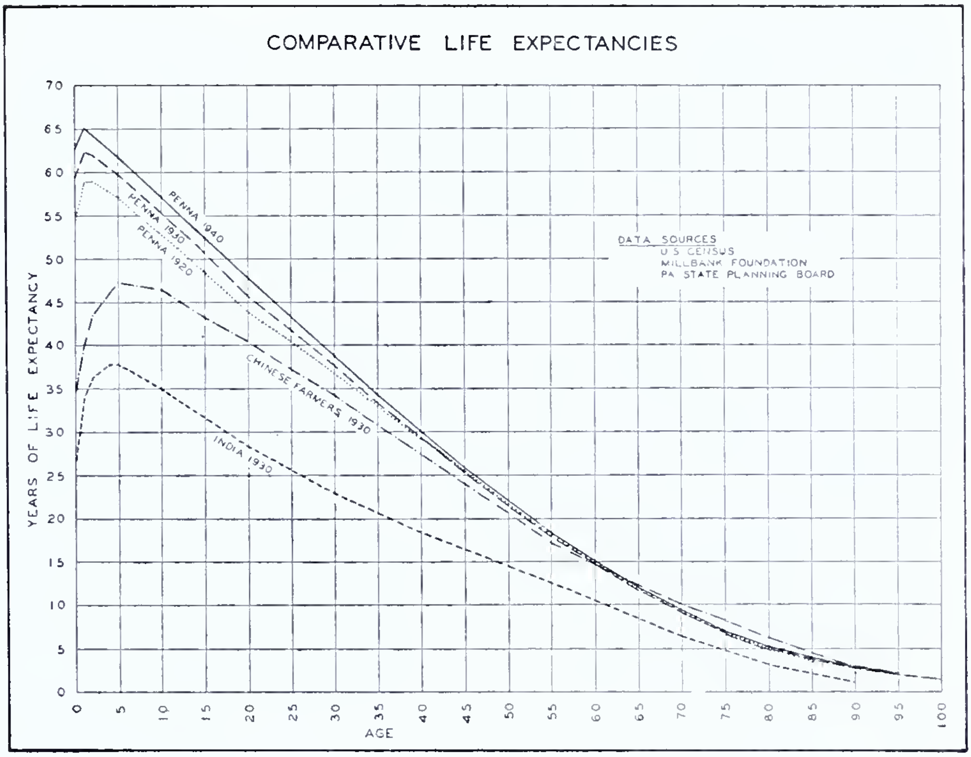


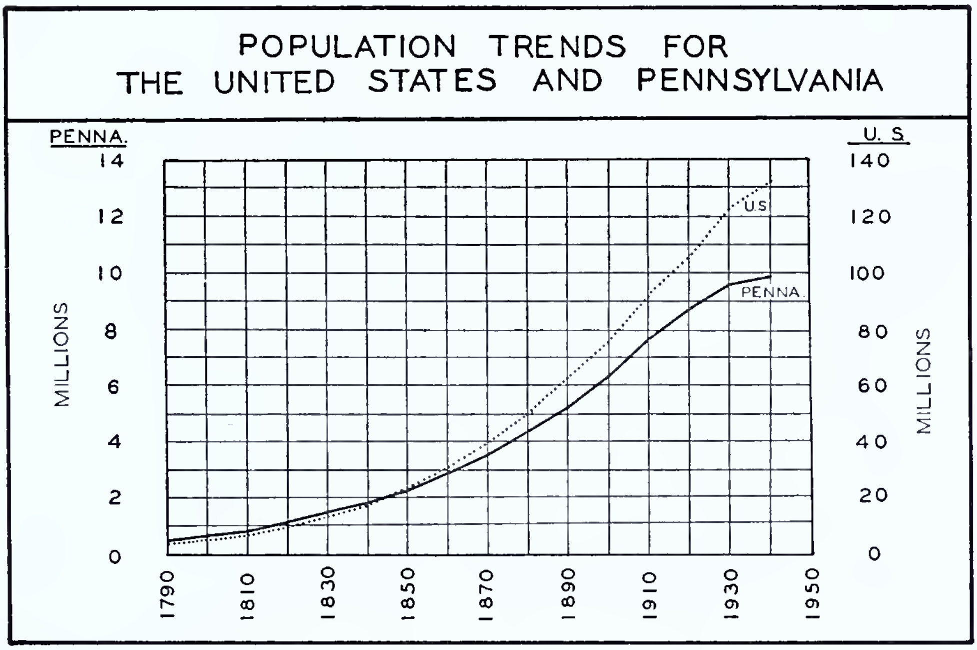
PLATE 12

prove public health is felt only in the lower ages. This is a phenomenon which has been noted throughout human history and it is safe to say that the life expectancy of a citizen of Imperial Rome, at the dawn of the Christian Era, was not very different at age seventy-five from that of a modern American, and that in the United States of 1790, when life expectancy at birth was somewhat below twenty-eight years, a man who attained age 75 had as great a chance of surviving as does his great-great-grandchild who has attained the same age in 1940.

Explanations of this fact are many and contradictory, but it is probable that the qualities that enable a man or woman to survive past three score and ten have not much altered in the past twenty centuries nor do they change much from race to race or climate to climate. This will be seen in the accompanying chart in which are illustrated Pennsylvania's progress in life expectancy between 1920, 1930 and 1940, as well as the life expectancy of India and rural China. Here it will be noted that though the Chinese farmer at birth, and for many years to follow, has a much lower chance to survive than has the average citizen of Pennsylvania, those who do succeed in living on to the beginning of old age have a better life expectancy than does a citizen of this Commonwealth in the year 1940.

The facts set forth in this life expectancy table have a distinct bearing on the State's future problems. As the proportion of our population forty-five years of age and older has already greatly increased, a larger and larger portion of our people will soon fall into the age group whose life expectancy has not been greatly improved by modern medicine. Pennsylvania's death rate is therefore likely to rise in future years despite continued improvements in public health, unless the problem of health in old age receives greater attention that has yet been given it, and unless some of the mysteries of aging are solved by scientific research.

When this increase in death rate finally occurs, and if in the meanwhile our birth rate has not yet considerably risen, we shall finally approach the point where the population of the Commonwealth no longer rises, so to speak, under its own momentum. Since Pennsylvania is one of the most densely settled of our States and has a relatively stable population, such an adjustment is likely to occur somewhat sooner in this Commonwealth than in the United States as a whole. It should not, however, be assumed from these comments that such a condition is immediately at hand. Pennsylvania population increased nearly 270,000 between 1930 and 1940, despite the migration outward of some 285,000 people, so that our natural increase for that ten-year period, that is, the excess of births over deaths in the Commonwealth, was more than 550,000. With the improved life expectancy evidenced in the table presented here it is probable that some 593,000 will be added to the population of Pennsylvania between 1940 and 1950. If births continue at their present level during the ten-year period, Pennsylvania's total in 1950 will be some 10,493,000. It is not likely that our 1950 population will be so large as this because of probable migration out of the State, but it is interesting to realize that despite the increase in the average age of our population already noted, Pennsylvania's natural increase in the next decade is likely to exceed that which occurred between 1930 and 1940.


POPULATION TRENDS FOR THE UNITED STATES AND PENNSYLVANIA

PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

PLATE 13

PENNSYLVANIA'S FUTURE POPULATION

Any estimate as to the actual number who will be recorded as inhabitants of Pennsylvania in 1950 is attended with peculiar difficulties in a period of world disturbance such as that we are living through today. It may, however, be noted that in the curves recording the State and National growth on Plate 13, neither the First World War nor the Civil War caused any marked interruption to the smooth upward movement, nor is it likely that the present World War will do so. All normal population growths follow the pattern outlined on these charts and form a characteristic S-shaped curve reaching, in time, a level of stability in which population and the means of subsistance attain a balance under the prevailing standards of living.

That Pennsylvania's growth in the past one hundred years has been somewhat slower than the national growth, and that the State's population appears to be reaching a point of stability sooner than that of the nation as a whole, is due merely to the fact that Pennsylvania was one of the earliest settled parts of our national territory and was consequently certain to adjust its population to its resources and standards of living earlier than the more lately settled areas in the south and west. It is probable, therefore, if present standards of living are maintained in the State and if some new and unforseeable economic change does not occur, that the population of the Commonwealth will attain its maximum within the next twenty years, and that its growth within the next eight years is not likely to increase the total population beyond approximately 10,200,000 although, as stated above, through natural increase, our present population will produce a total of nearly 10,500,000 by 1950. This estimate of 10,200,000 implies that a migration out of the State comparable to that occurring between 1930 and 1940 is likely to take place during the present decade, and also that recent rises in the birth rate are not likely to continue as a permanent tendency during the ensuing eight years.

It must be remembered, however, that such speculations as to the future are subject to a large correction by factors which are not foreknowable. Standards of living may change. Means may be developed by which a far larger number of people may live comfortably in a given area than now seems probable. Interstate migration may be checked, due to increasing competitive pressure in the Nation's less settled areas. For these and other reasons any extensive speculation as to the State's population in 1950 appears unwise and premature. It must be emphasized moreover that mere growth in numbers is no longer a safe index as to the prosperity and well-being of a State or a Nation. By such a standard, India, with its high birth rate and great density of population, might rank above all other countries, and New Zealand and Australia, where life expectancy is the highest ever attained, would be placed far down in the list of civilized communities.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols, 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

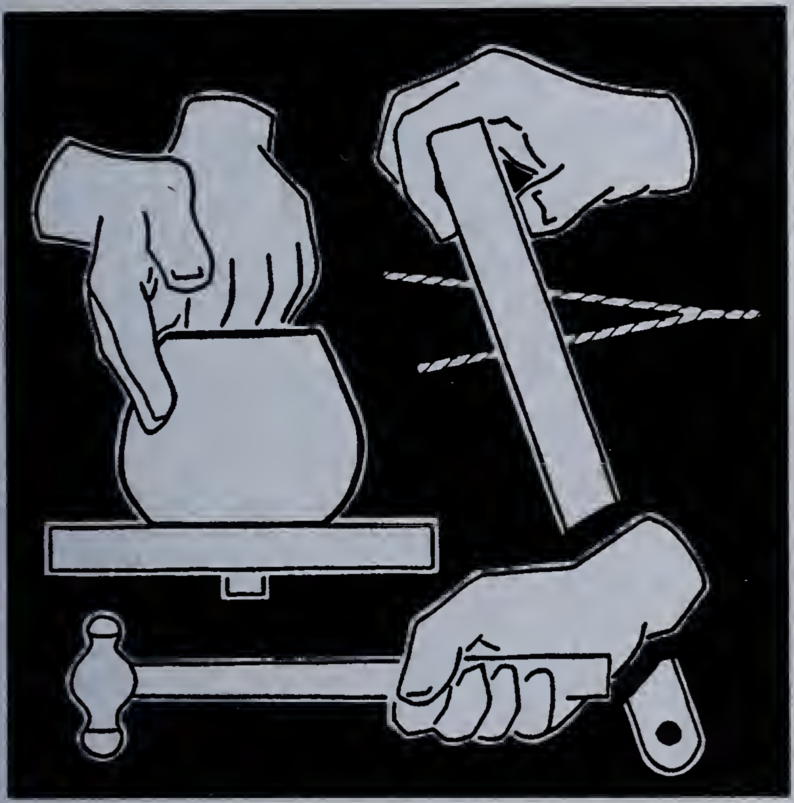
*Local Tax Rates, May-June, 1940.
*Air Photography, November, 1940.
*Defense Problems, January-March, 1941.
*Post Defense Problems, April-June, 1941.
Index of Publications, August, 1941.
*Community Self-Appraisal, September-October, 1941.
*Self Appraisal for Increased Production, November, 1941-January, 1942.
*Community Self Appraisal (Revised Edition), April, 1942.
*Comparative County Data, May, 1942.
*Planning and Zoning Progress in Pennsylvania, July, 1942.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

A democracy,—that is a government of all the people, by all the people, for all the people; of course, a government of the principles of eternal justice, the unchanging law of God; for shortness sake, I will call it the idea of Freedom.

—Theodore Parker, 1850.

PENNSYLVANIA PLANNING



DEPARTMENT OF COMMERCE
COMMONWEALTH OF PENNSYLVANIA

STATE PLANNING BOARD

MAY 1943

HANDICRAFTS IN POST WAR PLANNING

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To inform those who
are interested and
to interest others.

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(Copies of this and of other issues of Pennsylvania Planning available on request)

What We Do for Ourselves

¶ Machinery has gone to war, and America is in its shirt sleeves again.

¶ More than at any time in fifty years, our way of life depends on what we do for ourselves.

¶ Neither Government nor industry can do more than to protect our vital needs.

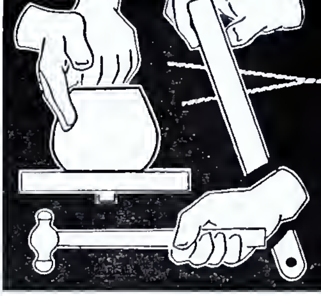
¶ To maintain our way of life we must turn to the resources of our own homes and neighborhood and add by the work of our own hands to the wealth and morale of our families, our friends, our communities, and our country.

¶ Home gardens must supplement the products of our short-handed agriculture.

¶ In the cities and on the farms handicrafts of every sort can increase the output of needed civilian goods and aid in the upkeep of irreplaceable utilities.

¶ At all ages and in every walk of life our war-time recreation can be made useful.

¶ In doing these needful things for ourselves and our neighbors and in developing the handicrafts of the State to meet the needs of war, we are also preparing a post-war pattern of life that can give employment to our older workers, to our young men and women, and to our disabled soldiers.



Pennsylvania Handicrafts— Their Place in War and Post-War Living

A time of war is necessarily a time when all people need to be busy and productive. Many of our customary pleasures must be given up. Travel consumes vitally needed materials and has to be restricted. This goes hard with a people as fond of movement and change as we are. As the period of war is prolonged, more and more of the work of maintaining a home must be done in the home and less and less can be done in the factory. Old ways of living have to be revived. This fact has already been discovered in Great Britain and Canada, neither of which countries has ever been so highly mechanized as our own. Beginning with household repairs and a change in our methods of cooking, as factory canned and prepared foods become less available, every town, every family, every man, woman and child in a nation at war is called on to become more and more self-sufficient.

What we may face in the near future, as indicated by the War Production Board's summary of minimum civilian requirements, is a world in which new household furniture, rugs, toys, clothing and many other of our accustomed utilities will all be scarce. The use of waste materials will become important. The production of many needed things will become a family problem. In short, the mechanical age, so far as it concerns civilian life, has had to go into reverse in order to turn its whole power into the waging of war.

Under these conditions many simple domestic handicrafts, which can be practiced by anybody, will help greatly to maintain our civilian efficiency and morale. Recreation is necessary, but recreation can be useful. Our older people, our children, and all those not employable in some form of the war effort can do much to help maintain the American standard of living. Quilting and garment making, the preserving and canning of foods are today important activities for the American home. The manufacture and repair of furniture, the reconditioning of farm and household equipment are becoming occupations of growing necessity.

There is scarcely a town or village in all of Pennsylvania that does not contain an automobile repair shop with some form of mechanical equipment. The machinery in these shops is generally not suited for industrial production. It was designed for repair work of a rather specialized kind. Such shops replace the old blacksmiths and wheelwrights that were at one time a universal feature of American town and village life.

Today, automobile travel is greatly curtailed. Many of these shops are idle, yet they form one of our most valuable assets for maintaining the smooth operation of our homes and our small industries. The repair and maintenance of the hundreds of mechanical devices in the American home and of the operaating machinery on farms and in local industry seems far afield from the special job that the automobile repair shops formerly undertook. But now is a time when every possible resource for maintaining American life and production has to be used.

In the old days the village blacksmith was not merely a shoer of horses. He was called upon to weld the axles of wagons and the tires of cartwheels. He repaired broken down bicycles and velocipedes. With the village tinsmith, he supplied his community's needs for the repair of every kind of equipment from broken scissors to broken plows. The automobile repair shop has taken over this function but has been, up to now, far more specialized than the village blacksmith was ever allowed to be. Today in the midst of this great war, which has changed our ways of life more violently than any event in the past eighty years, the local automobile repair shop has its greatest opportunity of service.

Young people become idle and demoralized in a social scheme in which they have no important place. That place needs to be found. Girls and boys of high school age can be of help in maintaining family morale and neighborhood morale. The good work done in the iron and aluminum scrap drives by the young people of our Nation deserves high praise, but that is only a beginning of the service they can render. The making of airplane scale models for the instruction of airplane watchers is but a hint of the possibility of using the surprisingly accurate knowledge of our young people in the fields of their interest. Their contribution to the war through farm labor, through household repairs, through aid in the many home arts that must be practiced now to insure an adequate background to our industrial and military effort is important for them and for us all.

When the boys come back from war, our industries and our commerce must be ready to return them to their jobs. Our older men and women may no longer be needed in factory production. Thousands of women now employed in our war plants may also be idle. Our younger boys and girls will be greatly in need of healthful, part-time work to help them through their college courses. Wounded, and otherwise disabled veterans of the war will have to go through a period of readjustment before they resume normal civilian life.

During the period of post-war readjustment, it will be as necessary, as during this time of war, to find useful occupations for all those who are able to work. The handicrafts provide one solution to this problem, but it is not a solution that will be of much avail unless we now maintain these crafts through the work of those who are not otherwise able to do things useful to the National welfare.

Almost every American neighborhood, rural or urban, is a reservoir of skills. Almost every Pennsylvania rural neighborhood is a source of raw materials. To turn these skills and unused materials to constructive use is a war-time responsibility for those who have mastered any of the various types of handicrafts and who are unable to join in our military and industrial effort.

In the pre-war years thousands of Americans of all ages and all classes added to the income of their families or found a place for themselves as producers, despite accident or disease which had unfitted them for other forms of production. They have done this through a great variety of occupations, such as rug making, weaving, chair caning, furniture and cabinet making, bookbinding, the growing and preparation of herbs and medicinal plants—the list is practically endless. Among these crafts and arts are many which can be practiced by old people and many which are adapted to rural life and to the use of native, farm-grown materials. Some could be practiced in a college workshop whose products could be sold for the self-support of students. Many of these crafts have been used with great success in the rehabilitation of mentally or physically injured veterans of the first World War.

Handicrafts are adapted to many types and degrees of skill, and all of them can be used for producing things needed in American homes. Their products appeal to every level of income, are often highly valued and command good market prices. By engaging in such occupations and creating such products thousands of people have added to their welfare and happiness.

Pennsylvania is peculiarly rich in its traditions of handwork of every kind. As one of the oldest American states the Commonwealth has a proud record of handicrafts, many of which were developed in early colonial times, and have been continued to the present day. They are among the most original of the American native arts.

At a recent international exhibition in Madison Square Garden a display of Pennsylvania handiwork, under the sponsorship of the Pennsylvania Department of Commerce, was generally admitted to show a richer variety and a more interesting character than did that of any of the Allied Nations who sent their products to the show. Furniture made from Pennsylvania native woods, pottery moulded from Pennsylvania clay, tweeds and worsteds hand-woven from Pennsylvania wool, jewelry and decorative articles carved from anthracite coal are a few among the many demonstrations of the possibility of using the materials of the Keystone State in producing hand-made objects of use and beauty.

With such a background and such a present accomplishment, Pennsylvania may well take first place in the development of handicrafts to provide post-war employment. The Commonwealth is today leading all states in our Union in the extent of its industrial production for a Nation at war. It should also assume a like leadership in preparing to meet the problems of the peace which will follow.

The following list of a few of the many types of handicraft work which have been practiced with success in Pennsylvania will give a hint of how extensive a field lies open for those who are willing to undertake the making of things from our native materials.

1. **Basketry and Chair Caning.** This includes the manufacture of market baskets, waste baskets, trays, fishing creels, flower containers, clothes hampers, and the weaving of rush, cane and splitwood seats for settees and chairs. The rushes, sedges, grasses, cattails, willow twigs, ash and oak splints used in these crafts are all native to Pennsylvania. The products are needed in every home and the skills are easily acquired.

2. **Bookbinding.** This is both useful and, if one's skill allows, a highly ornamental form of handicraft. The need for practical rebinding of books is very extensive and the creation of fine and artistic bindings provides scope for the highest possible craftsmanship. The general principles of this craft can be learned without an instructor.

3. **Leather Work.** Pennsylvania is one of the Nation's great leather producing States, and in normal times material for the manufacture of moccasins, gloves, jackets, belts, wallets, sandals and shoes is readily obtainable. The hand decoration of leather objects affords further opportunities for skill. There are many textbooks on this subject, giving step-by-step instruction.

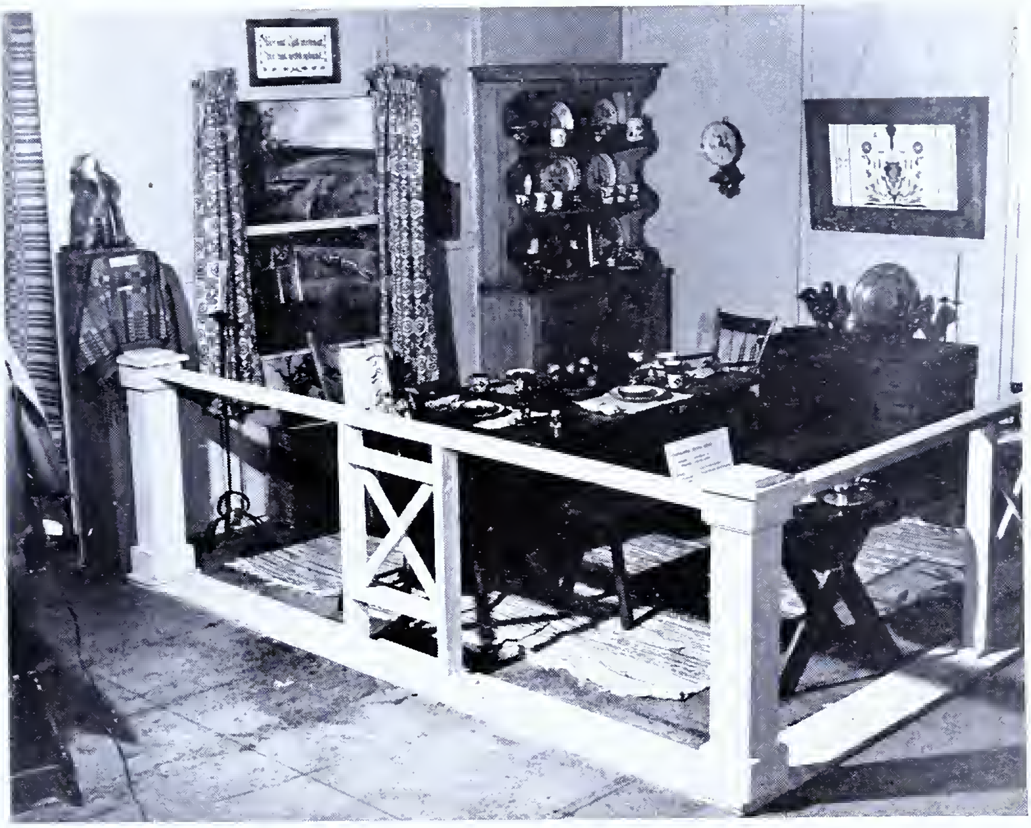
4. **Woodwork.** Many forms of woodwork such as the making of old-fashioned splint bottom chairs, and of children's games and toys are today practiced in Pennsylvania, both as individual crafts and as commercial industries.

   For the average man the woodworking crafts present the most obvious and satisfactory outlet for manual skill. Even the repairing of household furniture and equipment today offers a field of exceptional usefulness.

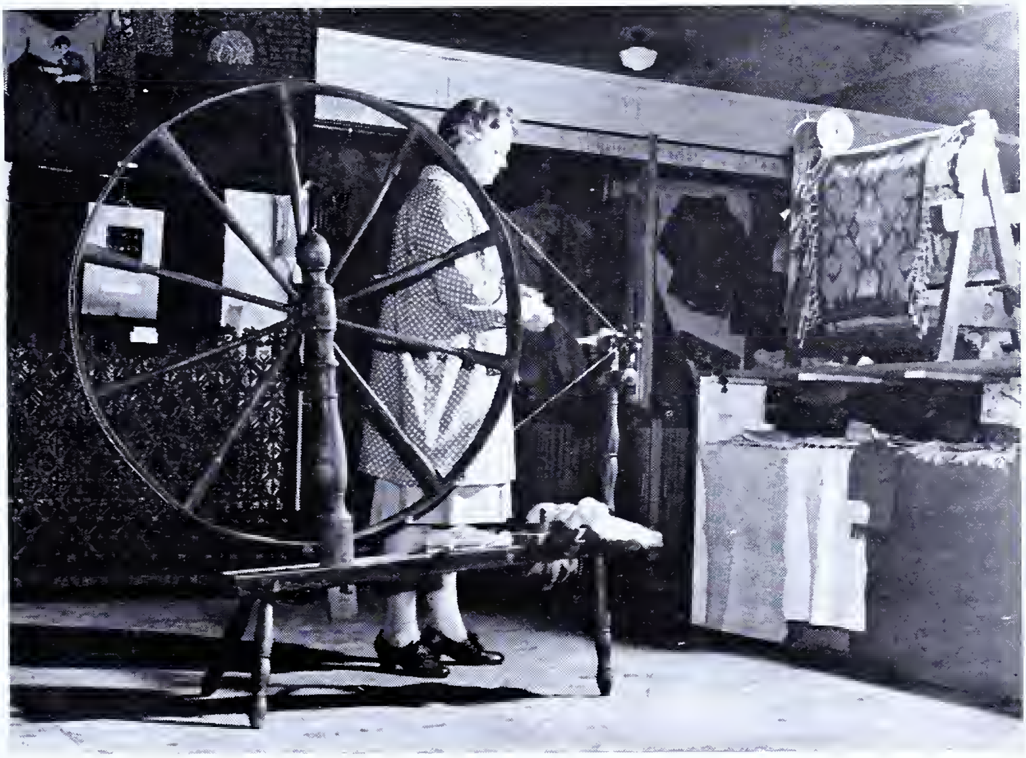
   As skill is acquired in the handling of wood, finer work such as cabinet making, wood carving, and even the production of musical instruments offers occupations which even in the height of mechanical progress have provided employment for many Pennsylvanians.

5. **Spinning and Weaving.** Once woman's chief domestic occupation, spinning and weaving today offer interesting possibilities of useful recreation and the opportunity for individual decoration in the home, as well as the means for substantial addition to the family income.

   The most valued wool suitings for both men and women are handwoven from handspun wool. Much of this material has formerly been imported, but the spinning and weaving of native wools can now add greatly to the prosperity of American men and women in rural neighborhoods, giving employment to our older workers and providing a basis for flourishing industries, in Pennsylvania, as it already has done in other states.



Pennsylvania Dutch Corner



Spinning Pennsylvania Wool
(From Department of Commerce Exhibit Women's International Exposition, New York, 1942)

From Pennsylvania Department of Commerce Exhibit, Women's International Exposition

Pottery Demonstration
(Department of Commerce Exhibit, Pennsylvania Farm Show, 1941)

Many spinning wheels formerly preserved as antiques are now being put into use in Pennsylvania. These old wheels are of two quite distinct types.

The tall or wool wheel is turned by hand and is used almost exclusively for the spinning of wool by holding a roll of carded wool in the left hand and drawing away at an angle from the spindle, around which a starting piece of yarn has been attached, while the right hand revolves the large wheel. Each length of yarn when twisted sufficiently is wound on the spindle, the point being left free to continue the spinning of succeeding lengths, thus forming a continuous thread which is then ready to skein.

The low, or flax wheel is operated from a sitting position with a foot treadle. This wheel is adaptable to the spinning of any kind of fibre, provided the proper adjustment is made in the speed of the winding mechanism. This wheel spins through an eye at the end of the spindle and is equipped with a winder which feeds the thread on the bobbin as rapidly as it is formed.

Skill in forming a thread of proper twist is readily acquired and a considerable output of yarn for knitting and weaving can be made through occasional work in one's spare hours.

The weaving of cloth is essentially a simple process. Many useful and beautiful types of weaving can be done on simple home-made appliances, such as the frame loom still used by the Navajo Indians for the making of rugs and blankets. The cardboard loom with pins for pegs can be adapted to weaving articles of odd shapes such as berets, slippers, and bags without seams. Egyptian tablet weaving is done with small punched cards.

Any household in which there is a man moderately skilled in the use of tools can enjoy the possession of a hand loom capable of weaving cloth suitable for curtains, table covers, suitings, dress materials, rugs and blankets. Such looms can be constructed without the use of any essential war materials. It is also still possible to purchase looms for every possible kind of hand weaving.

6. **Rug Making.** Rug making, by hooking, braiding and weaving, is extensively practiced in Pennsylvania, both in cities and on farms. These crafts can easily be self-taught. There are many books and pamphlets available on rug making, one being published by The Pennsylvania State College Agricultural Extension Bureau which gives helpful hints in design and color harmony.

7. **Metalwork and Jewelry.** These crafts require more complicated tools, equipment and skills for fine work, and personal instruction is usually necessary. Where one person in any neighborhood is skilled in such a craft, or has the equipment to carry it on, a center may readily be developed. In many parts of our country such a growth has led to important local industries.

   In certain localities in Pennsylvania may be found various types of native gems such as moon stone, sun stone, garnets and specimens of clear and colored quartz. Anthracite and "coal diamonds" have also been used to produce distinctive jewelry closely resembling jet.

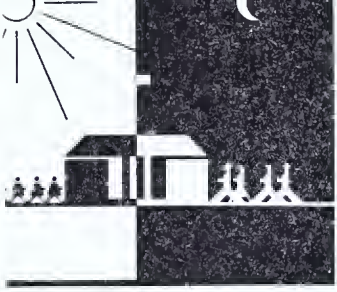
8. **Pottery.** Pennsylvania possesses clays suited to almost every type of fine ceramic work, and these clays have been extensively used in the past for the production of pottery and stoneware vessels which are now highly prized museum pieces. A few old Pennsylvania pot-

ters still carry on their traditional art, while others are making use of the latest discoveries in glazing and firing. Hand-made objects of ceramic art are in increasing demand.

It is not difficult for one unfamiliar with the fundamentals of pottery making to develop this form of handcraft so far as the shaping of an article is concerned, nor is elaborate equipment necessary, as most of our primitive pottery is made without the use of a potter's wheel. Many methods of making hand-built pottery are described in books on this subject, and a pamphlet containing three lessons for beginners is published by this Department.

9. **Fishing and Camping Equipment.** The making of knapsacks, sleeping bags, tents, fishing rods, creels, and fisherman's flies, fit well into our present program of outdoor, health-building recreation.

10. **Farm and Forest.** Other rural crafts would include preserving, the growing and preparation of medicinal herbs, spices, vegetable dyestuffs and the processing of hemp and similar fibres, which are definitely allied to our defense program. In many sections the making of Christmas novelties from evergreens, pine cones, berries and acorns has become an important source of income. Whatever form a home industry takes, the simplest basis is always the use of local materials and the making of things for which there is a local need. The handicrafts began at home. The closer they stay to the resources of Pennsylvania's farms and countryside, the more they can do to add to the welfare of our people by lightening the burdens of old age and assisting in the rehabilitation of our industrial and military casualties.



The Continuity of Pennsylvania Handicrafts Through Educational Opportunities

By

DR. C. VALENTINE KIRBY

Chief of Art Education
Pennsylvania Department of Public Instruction

> *Beauty must come back to the useful arts and the distinction between the fine and useful arts be forgotten. . . . If history were truly told, if life were nobly spent, it would be no longer easy or possible to distinguish the one from the other. . . .*
>
> —RALPH WALDO EMERSON.

Knowledge and practice of Art can give more pleasure than almost anything else with which the individual may deal. Art develops vision and reveals hidden beauty. It is like the window in the workshop that lets in the sunshine and gives a beautiful outlook. It makes common things valuable. A flower pot is worth only a few cents, a bowl of the same clay a few dollars, a vase exquisitely formed and finely glazed and decorated by a master is worth hundreds of dollars. The difference between a common kitchen chair and a Chippendale chair is a matter not of material but of art.

Pennsylvania is famous for her art—her painters, her sculptors, her builders, her artisans are known the world around. In their creations we find the highest realization of the talents of our people.

Pennsylvania's classrooms are perhaps the most influential factors in determining the characters of the more than two million boys and girls who are attending its schools. Some of these boys and girls will be creators of art. All should be appreciators.

The exigencies of earlier days called for skills in a variety of tools, materials and operations. Particularly noteworthy was the metal craftsman who designed and wrought hinges, locks, brackets, lanterns, tools and other metal objects. The blacksmith of this earlier day "toiling under the chestnut tree" was an artist in every sense of the word. Apparently he had regard for both the opportunities and limitations of his tools and materials, and he loved his work.

One of the oldest crafts, and one whose product was required in every home, was the art of weaving. By every fireside were woven rugs, coverlets and other textile materials. Many of these are preserved in our museums as examples of fine design, color and workmanship. Our State Museum, Harrisburg; the Bucks County Museum, Doylestown, and others are exhibiting and preserving for us the tools of the early cabinetmaker, the worker in glass, the weaver, the carver of butter and cookie molds, as well as intriguing firebacks, dower chests, and numerous other records of the life of early Pennsylvania.

The advent of the "machine age" did not altogether displace the hand craftsman. In fact one may discover here and there in quite out-of-the-way places, the old traditional craftsman still carrying on, bridging the gap between earlier days and this machine age of ours.

There is an assurance that there will be no interruption in the continuity of Pennsylvania Art and handicrafts as teachers and supervisors of our public school system are prepared to pass on to both children and adults knowledge of and skills in our traditional handicrafts. More than one thousand certificated art teachers and supervisors in service are competent not alone as teachers of handicrafts but as craftsmen as well.

Particular interest now centers in our adult population and in the provision for evening schools where may be learned crafts of various sorts. Fortunately, there is Permissive Legislation whereby a Board of School Directors can maintain any type of instruction—as a recreational or social service for out of school use and adults, and with full Edmonds aid. Furthermore, mandatory legislation provides that any activity maintained in day schools of the district must be provided in an evening school, free of charge, when fifteen or more residents make written application for the same. Classes of this sort are in operation in a large number of districts throughout the State and a visit to one assures an interesting and stimulating experience. Here one finds the house mother is making some article needed to enrich the home—the factory worker is finding a release from monotony by carving wood, modeling clay or hammering metal—the depressed ones are forgetting for the time being as they become absorbed in a hooked rug or a piece of the potter's craft—and all are learning a profitable and pleasurable way of disposing of "off" hours and boredom.

Pennsylvania, rich in art achievement, recognizes that it is through education that we preserve the best of the social heritage; that an investment in beauty is a profitable one and yields dividends of a high order; and that the schools must be used as a medium for the preparation of both creators and consumers in the field of the beautiful.

> *It becomes evident that to speak of art in a democracy is not to refer to a select aspect of life to be carried on by a few gifted persons, or to be enjoyed only in hours of leisure, or in museums, or only by persons of wealth, cultivation and leisure. It refers, rather, to the provision for engaging in all of the activities of life in a manner that will bring individual growth to all members of the society. The values of art must reach the masses if they are to be consistent with democratic principles.*
>
> BURL N. OSBURN.

The Handicrafts as a Means for Rehabilitation of Mental Patients

By

WILLIAM C. SANDY, M. D.

Director, Bureau of Mental Health
Pennsylvania Department of Welfare

Long before special institutions for mental patients came into existence, the therapeutic values of diversion and to some extent work or forms of employment for the physically or mentally sick were recognized, to judge from ancient writings. The early mental institutions were called "insane asylums" and as the term denotes were largely places of refuge, providing primarily more or less kindly custodial care. In the asylums, however, opportunities for employment were available to patients, and they were encouraged to work, participating in the housekeeping, farm and industrial activities, primarily, it may well be at first, as a contribution to the economical administration of the institutions but often incidentally resulting in the improvement of the individual patient. Supplementing such activities, a small number of patients, mostly women, talented and trained in civil life, were grouped in so-called "art classes" to do fancy work of various kinds and often proved capable of exquisite productions.

In the early years of the mental hygiene movement beginning around 1909, asylums were being developed into treatment and curative mental hospitals. In scattered instances, there began organized efforts to interest patients individually in some form of occupation under medical guidance. But it was during World War I that those activities were greatly stimulated. It became recognized that physical exercise and other organized measures, such as directed productive work, diverting the attention from sickness and other disability, shortened convalescence, restored and strengthened the capacity to "carry on" and brought about a return to duty with the least possible delay. Thousands of trained craft workers were engaged in applying such principles and thus occupational therapy took a definite place in the treatment resources of the military hospitals. Schools of occupational therapy were established to meet the increasing demand for trained workers in this field, and mental hospital administrators became more widely interested.

Occupation is by no means a cure-all but it is an important form of treatment of mental patients. A department of occupational therapy is now a definite part of the treatment facilities of a well-equipped and adequately conducted modern mental hospital. These departments are directed by well-trained graduates of accredited schools of occupational therapy and they function under the supervision and advice of the medical staff.

Occupational therapy has been defined as "any activity, mental or physical, definitely prescribed and guided for the distinct purpose of contributing to and hastening recovery from disease or injury." * In respect to mental patients, the objectives are at least threefold.

1. To promote recovery.
2. To retard deterioration.
3. To re-educate patients, particularly those liable to remain a long time in the hospital to such an extent that their activities may contribute to their own welfare and the economical conduct of the hospital.

In general, the effort is to help the patient regain self-control, to afford him an opportunity to develop satisfaction by worthwhile accomplishment and to prepare him (in many cases by graduation from occupational therapy into the practical indus-

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* Dr. H. A. Pattison, 1922.

A Pennsylvania Weaver At Her Loom

Weaving Room in Occupational Therapy Department,
Pennsylvania Hospital

Textile Block Printing, Occupational Therapy Department, Pennsylvania Hospital trial activities of the hospital) to return to the community and self-support. For example, in acutely disturbed cases, the objective is to decrease motor restlessness and to encourage concentration on useful effort; in the depressed, training for concentration of attention away from self and on to interest in concrete things; in the self-centered, perhaps overwhelmed by fantasy or delusional trends, participation in group activities and interest in other persons and things; in the destructive, untidy, deteriorating cases, to occupy them as usefully as possible, train in better habits of neatness and cleanliness, and to counteract the tendency towards ruthless destruction of clothing and equipment, thus incidentally materially reducing the cost of care.

In prescribing the appropriate form of occupational therapy, consideration should be given to the physical and mental condition of the patient, his intellectual level, his interests in civil life, his personal inclinations, the special problems presented at the time and the ultimate objective in treatment. Widely diversified forms of graded occupation need to be devised and made available. For example, the restless, untidy, apparently deteriorated and destructive may with difficulty be interested only in such elementary work as the tearing of rags for later weaving in rugs, or the sand-paper smoothing of pieces of wood for later use in making toys or furniture. Various other gradations include basketry, rug making, such as the woven types or hooked rugs, toys, tooled leather and bead work, art metal work, bookbinding, weaving, lace making, painting, clay modelling and sculpture. Willow furniture making, woodworking, including furniture making and repair, chair caning, broom and brush making, have therapeutic value, but probably more nearly constitute industries.

Various group activities should also be considered important forms of occupational therapy. Among these are participation in religious services, games, musical activities, such as community singing, band and orchestra, also different kinds of dramatic performances, such as pageants.

As patients become improved and more proficient, they may graduate into definite industries, such as the various shops, e. g., painting, carpentry, plumbing, tailor, sewing room, shoe repairing, laundry, kitchens, on the farm, garden, orchards and dairy departments. Many patients may reach such levels of efficiency but remain under continued care because of a mental condition not permitting community life. Many other patients, however, are through such graded occupational opportunities, better prepared for parole and eventual discharge.

Occupational therapy, therefore, makes a definite and important contribution in the treatment of mental patients. When properly applied, occupational therapy results in a favorable reaction not only on the patients but also on the personnel of the hospital and its administration. It seems probable that such activities might with profit be more extensively established in general hospitals as a preparation for problems almost certain to arise in the near future as a consequence of war.

The State Planning Board of the Pennsylvania Department of Commerce, in its efforts to promote the interests of Pennsylvania craft workers, is compiling a directory of craftsmen in the Commonwealth. The Department is desirous of obtaining the names of all those skilled in any of the crafts, and those wishing handcraft instruction.

Handicrafts on the Farm

By
MILES HORST
Secretary, Pennsylvania
Department of Agriculture

No one of course can foretell the future but it is not beyond the realm of possibility that the post war period may bring conditions which will require that still greater emphasis be placed upon individual initiative and enterprise. These have always been and will ever continue to be the outstanding traits of the farmer. He is inherently a craftsman.

Changing conditions bring new forms of resourcefulness. Advances made in farm operations and in the general level of life on the farm have brought the discarding of many of the crafts which were practiced in years past but they have been replaced by new crafts which are developments of those advancements. Mechanized equipment has opened a new avenue for still greater ingenuity on the part of the farmer which can stand him in good stead for the development of new craftsmanships.

The war has brought great changes in the processing of food which may prove to be accepted methods after the war shall have ended. These changes, involving both fruits and vegetables may bring the development of new processing methods on the farm as well as new types of consumer outlets. It can readily be foreseen that with the close of the war will come the return of travel by automobile on an unprecedented scale. Highway development will unquestionably forge ahead tremendously. Areas not now readily accessible may be traversed by main thoroughfares. These things will bring the farm nearer the centers of population and permit of it becoming the outlet of supplies direct to the consumer to a greater degree than has even been known. The farmer can construct attractive roadside stands, and with well-placed displays of products produced through the practicing of the crafts which he now knows and which he can develop will attract an ever increasing flow of consumer trade. The greater development of this trade may prove the opening wedge to the beginning of the solution of one of the greatest and most complex of all problems, distribution.

Many crafts could be revived and others developed to provide sources of great interest as a part of farm life. Some could be engaged in as purely diversion while others would hold possibilities of development into sources of augmented income. The wood-working crafts offer a great diversity and much interest. Establishing an interest in the farm home in one or more of the crafts may prove a factor in keeping the younger folks on the farm, since they provide diversion during spare time.

At the present time agriculture is devoting every ounce of effort to providing the unprecedented food supplies required for the prosecution of the war. This effort will be continued without abatement so long as the necessity continues. But while this effort is being made, in spite of it being pretty much all-consuming in thought and energy, consideration could well be given to the inevitable fact that peace will bring tremendous changes from the conditions existing at the present time.

Agriculture is the fundamental basis upon which the existence and development of the country depends. It is axiomatic that by the very nature of farm operations under the system of free enterprise, the farmer personifies the famed American ingenuity. This has been true since the founding of this country and it is this fact which brought into being those crafts which in our earlier history were the backbone of life on the farm. Many of those crafts have grown into tremendous industrial enterprises but they are not beyond serving again as an important part of the family life should the war prove to be a leveling influence upon the way of life throughout the world.

Does Weaving Pay?

By

CAROLINE B. KING

Former Women's Editor, The Country Gentleman

Does Weaving pay? Ask Reverend Glen A. Blackburn of Sault Ste. Marie, Michigan, this question, and you will receive an emphatic, enthusiastic "Yes," for your answer.

Weaving pays large dividends, Reverend Blackburn will tell you, dividends in satisfaction, in the cultivation of the cunning and skill of the hands, in the development of artistic bents, and, if a more practical dividend is desired, cash is to be had also.

Reverend Blackburn is not only the Rector of a parish in Sault Ste. Marie, he is also the archdeacon in charge of nine missions in nearby counties. One of these missions has established a young people's club which holds weekly meetings. In this club, there was a constant desire to make their organization more interesting, and Reverend Blackburn's aid in this effort was constantly sought, and, said the young folks, "If we could find a plan which would help us to raise a little money we would be very, very happy."

One evening the Rector had a suggestion for them—"Why don't you weave," he asked hopefully, having just happened upon an article in a magazine which told of looms and weaving, and furthermore, offered drawings and specifications for making a nice large rug loom, and the good rector's imagination had been fired with a desire to take up the old art so beloved by his grandmother, and see what could be done with it. So his suggestion to his young folks—

"Weave?" "How do you weave?" "Who could teach us to weave?" "Can you weave?" These and a dozen other questions from his eager audience came so fast there was no time to answer them, but finally he managed to tell them that while he could not weave as yet, it was ridiculously easy, and that they could even make their own loom—quoting the magazine article, to prove his statements.

So without further discussion it was decided they would weave, also that they would make their own loom. So enthusiastic was the response, and so delighted were the young folks, that it was not until Reverend Blackburn was on his way home that he remembered to be slightly panic stricken. He had never held a shuttle in his hand—didn't even know a shuttle from a heddle, nor indeed what a warp might be—but the die was cast. The club had elected to weave, and that was that.

However, things began to move so rapidly from that evening, it was difficult to keep up with them. An old log church, long ago fallen into disuse because of its lack of space, was obtained for a weaving room, and the boys and girls set to work getting it in readiness. A good friend donated lumber for the loom. A man who knew how to weave was found living in the town and on his advice two small table looms were purchased to be used while the big loom was being constructed. It all worked out smoothly. The weaving room when it was finished looked inviting and cosy. There was a good work bench made by the boys. Another kind friend had electricity brought into the building, and the rector managed to collect enough money for his project to add subscriptions to several craft magazines. And what fun they all had renovating the old church and making it an attractive and practical weaving room.

Soon the work of building the loom began. Sawing, boring, planing, smoothing, and fastening the pieces together was fascinating, the boys declared, and the girls did their part by furnishing sandwiches and coffee for the workmen. The small table looms arrived and the town's one weaver taught the girls how to warp them, but first it was necessary to make warping boards, a spool rack, and lease rods, all deep mysteries to the girls and their Rector, who was having his own worries at the time, lest the loom he and the boys were making would not work.

For safety's sake he decided to experiment at home, to build a loom of his own—and by working early and late and using every spare moment, he accomplished this project and set his 32-inch loom up in the Rectory, bought thread, prepared his warp—and—like magic it worked. He completed a linen towel on his home-made loom. It was really wonderful. The Rector and his wife now set up twenty yards of 16-inch warp and had the time of their lives making Christmas gifts and useful things for their home—and it was easy work, just as the Rector had said it would be, but more important—he was now equipped to help his young folks solve all their weaving problems.

The club's loom was finished just before the Christmas vacation, and in one joyous evening they made the warp, reeded, heddled it and placed it on the warp beam.

Eager and happy hands had prepared the rags and wound them on the home-made shuttle. Then the rug was begun. It was exciting. Every one wanted to weave at the same time, and so diligent were the workers that a rug began to take shape almost at once. When it was finished, cut from the loom, and the ends tied, the entire club wanted to stand on it at once and the Rector was probably the most delighted person in the entire group. The loom really did work!

And what those young folks have accomplished in the four years since their project was begun! From the sale of their rugs they have almost paid off the debt on the new church, and many of them are earning nice comfortable little sums for their own use. In addition they are brightening up their homes with rugs, runners, table mats, towels and other attractive articles, and more than all, they are recapturing the creative spark which so nearly died with the coming of the machine age.

In every home in that community there is at least one weaver. The table looms go the rounds from house to house so that all may have an opportunity to use them. One young man has built himself a loom which is constantly busy, and the loom at the club has been worked so hard it soon became evident that a second one must be built so that more young people might have a chance to weave.

The boys weave on shares, that is they furnish the warp for rugs and give the donors of the rugs a percentage of the finished rugs, or they furnish the warp and the labor, for which they charge a modest fee, and give the rag donors all the rugs made from them.

One year they held a bazaar, at which they sold fifty or sixty rugs at two dollars each. Should any boy or girl have a spare hour, they rush to the weaving room, build a wood fire in the stove and get busy with the shuttle.

Weaving is not hard, say these young folks, nor is making a loom a difficult proposition—it's all fun—good fun and profitable, too.

Yes, weaving is an exciting and fascinating occupation in that little town in Michigan. No one ever finds life dull or uninteresting since their good Rector introduced a loom to its citizens.

In the belief that coordinated effort can solve many problems for our craftsmen, the Pennsylvania Department of Commerce has started a bulletin service for those interested in the development of handicrafts in Pennsylvania. Copies of this bulletin will be sent on request. Address: State Planning Board, The Capitol, Harrisburg, Pennsylvania.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols., 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.
*Air Photography, November, 1940.
*Defense Problems, January-March, 1941.
*Post Defense Problems, April-June, 1941.
Index of Publications, August, 1941.
*Community Self-Appraisal, September-October, 1941.
*Self-Appraisal for Increased Production, November, 1941-January, 1942.
*Community Self-Appraisal (Revised Edition), April, 1942.
*Comparative County Data, May, 1942.
*Planning and Zoning Progress in Pennsylvania, July, 1942.
*Population, October, 1942.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

"The ennobling of daily and common work will one day put hope and pleasure in the place of fear and pain."

—William Morris.

NSYLVANIA PLANNING

PLASTICS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

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To inform those who
are interested and
to interest others.

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A Glance Toward Tomorrow

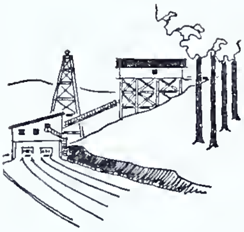
¶ In a lecture delivered 105 years ago the famous New England orator, Wendell Phillips, tells of a Roman who had been banished in the time of Tiberius and who returned to Rome bringing a wonderful cup. This cup he dashed upon the marble pavement. It was crushed but not broken by the fall. With a hammer he easily brought it into shape again. It was brilliant, transparent, but not brittle.

¶ This old story is the first known account of a substance similar to those developed by modern chemistry within the past ten years. No one knows whether the Romans really possessed the secret of a malleable glass, but it is certain that modern man is now in possession of materials of a kind never available in the world before.

¶ When peace returns to the earth again what these new substances may do to provide objects of use and beauty for mankind is still only dimly foreseen. This second great World War came upon a civilization in which many great discoveries of modern chemistry had not yet found their full application.

¶ It may well be possible that the whole pattern of world trade will finally be changed by such new products as plexiglass, nylon, and synthetic rubber, and that with that change may come widespread transformations in domestic industry and in the location of centers of manufacture.

¶ In the following pages is presented a brief survey of the field of plastics which may serve, in a sense, as a primer in this new industrial science.



Plastics in Pennsylvania

For a number of years the coming of a "Plastics Age" has been predicted by many who have had intimate knowledge of the subject. Today, under the impetus of war production and the many resulting shortages in critical materials, the acceptance and use of plastics has advanced to a degree which has surpassed even the predictions of the most enthusiastic prophets.

To meet the needs of war, the plastics industry has been given an unprecedented opportunity to demonstrate its worth in the production of countless new objects, as well as many products formerly made of other materials. This opportunity has been accepted and in a relatively short time this new industry has accumulated a record of achievement which will affect, to a considerable degree, the future life and economy of the Commonwealth. The "Plastics Age" has arrived. How will it affect Pennsylvania?

Raw materials found in Pennsylvania and by-products from many of the State's industries will find new uses in the manufacture of plastics. Present day industrial and agricultural wastes may also be converted to plastics. Plans for the future must consider this new outlet for Pennsylvania's raw materials, by-products and waste products, and provide for their conservation and fullest use.

New crops and new agricultural practices, as well as new practices in the conservation and use of Pennsylvania's vast forest reserve, will undoubtedly develop as a consequence of these achievements of organic chemistry.

Plastics will continue to invade the fields of many industries now established in the State. It will be imperative that these industries recognize this potential development and prepare themselves for the opportunities that may be opened as well as for adjustments that may be necessary to meet the new competition.

From a broader viewpoint it is not only conceivable but even probable that some areas now dependent upon long established industries which are threatened by the coming of plastics, may lose population to other areas either more advantageously situated for plastic industries or more progressive in adjusting their present facilities to the new era. Decentralization of urban areas, already started because of congestion and high service costs, may be accelerated by a growing plastics industry which might develop closer to the sources of raw materials and abundant water supply. Such a trend may also be encouraged by the fact that fabrication of many specialized plastic products is possible in small plants located in the smaller communities. Such population shifts and decentralization can create serious problems for the municipalities of the Commonwealth and deserve consideration by all local planning agencies.

The "Plastics Age" is a conservation age and it is significant that it parallels our growing need for conservation of our human as well as natural resources. As we recognize that natural resources are not unlimited and that the resources for healthful and pleasant living in Pennsylvania must also be conserved if the State is to continue its leading position as a place to live and work, we find ready for our use a new material which utilizes waste and by-products and encourages an economy based upon conservation.

Waste products such as paper mill liquors, now polluting the streams of Pennsylvania, can be used as raw material for this new industry. Such wastes are now being used to a limited extent. When further research finds still more uses for such industrial discards, Pennsylvania will be in a better position to regain its great recreational resources along the streams and rivers for the enjoyment and health of its citizens as well as for the pleasure of visitors from other States.

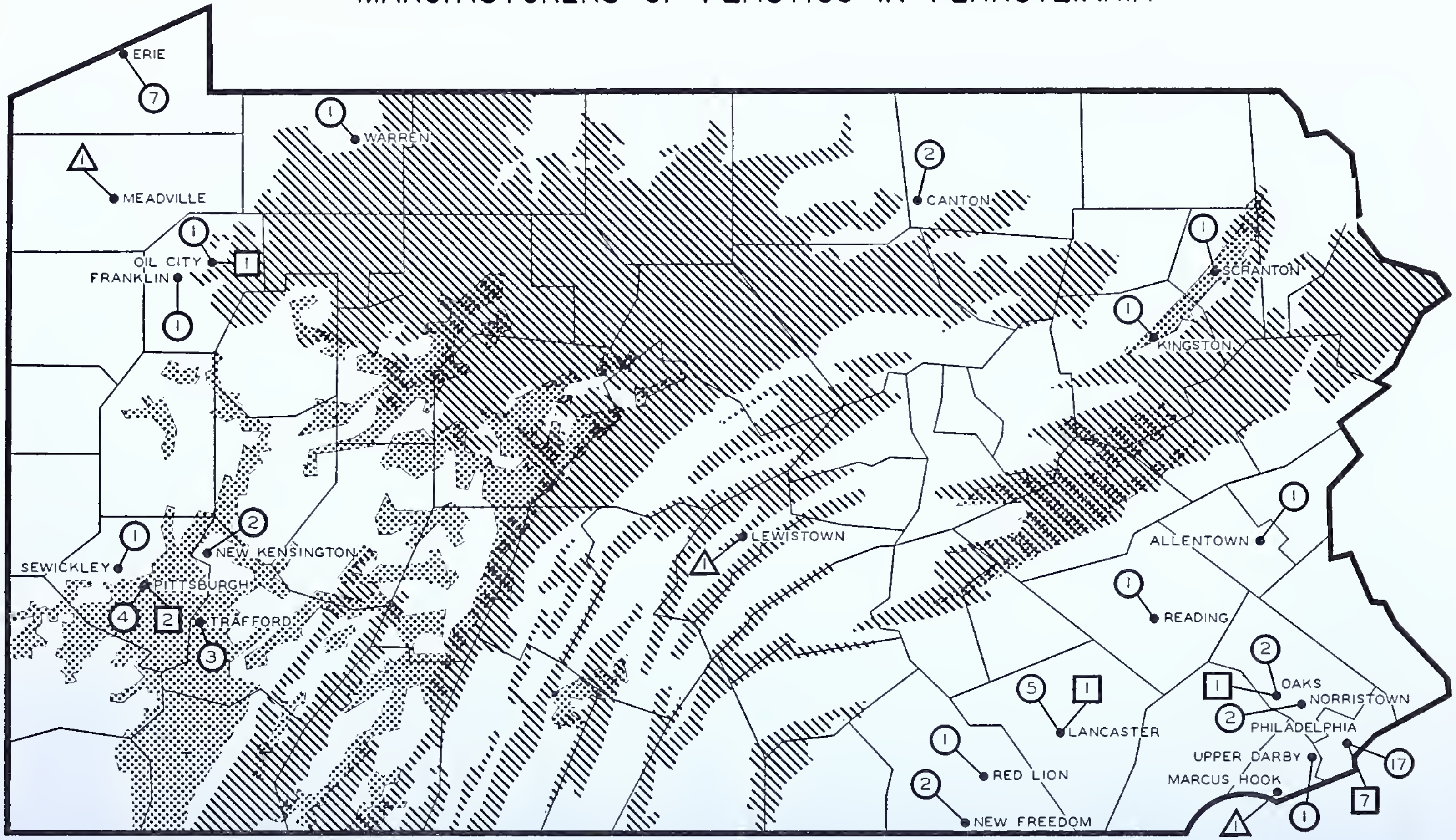
The further use of forest products and by-products as industrial raw material may also promote the development of community forests and for many smaller communities, a stable economy based on forest conservation.

Plastics will make available at low cost, many objects of use or convenience which can be produced with a minimum of labor. The assembly line brought about new efficiencies in production because it introduced standardized and interchangeable parts. These parts, individually, still require considerable labor in machining and finishing. In the fabrication of plastic parts further savings in labor can be expected, when with "one squirt in a mold" a part is made which requires little if any work to machine or to finish. Greater productivity with less labor will undoubtedly result from plastic molding. This, in connection with similar developments in other industries, suggests either a greater amount of leisure time or the need to develop other avenues for the utilization of labor. Such a trend will require serious study at every level of government.

It is obvious that so complicated a subject as plastics cannot be more than outlined in the following summary. It is hoped, however, that for a more detailed understanding of the subject as it may relate to specific problems, use will be made of the many excellent books referred to in the bibliography.

It is also hoped that with a more general understanding of the potential impact of the "Plastics Age," encouragement will be given to extensive research on this subject as it relates to Pennsylvania. Armed with factual knowledge resulting from research, and with progressive thought and action, Pennsylvania, because of its vast store of raw materials and its key location in reference to markets, is in a position to lead in the plastics industry as it has lead in the industries based on iron and steel.

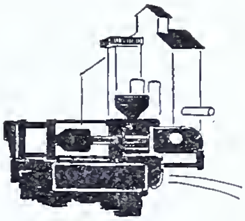
MANUFACTURERS OF PLASTICS IN PENNSYLVANIA *



* EXCLUDING PLANTS MANUFACTURING SYNTHETIC RUBBER AND OTHER BASIC WAR MATERIALS

☐1	PLASTIC MATERIAL MANUFACTURERS	MAJOR FORESTED AREAS	▨
②	FABRICATORS OF PLASTICS	OPERATING COAL FIELDS	▒

The Plastics Industry



PENNSYLVANIA PROVIDES THE MATERIALS

Coal, oil, natural gas and limestone, all natural products of Pennsylvania, are important sources for most of the materials which go into the manufacture of plastics. Pennsylvania has all these resources and products in quantity. It is also the leading State in coke production and one of the leaders in oil refining. From these various sources are obtained such products as phenol, acetylene, acetic acid, carbon dioxide, methanol, formaldehyde, ethylene and ketene and many others which are vital to the plastic industry.

Wood and wood-waste products from the forests of Pennsylvania can supply the wood flour which is an important ingredient in certain widely used plastic compounds. Wood also offers a raw material for the manufacture of the cellulose and lignin plastics. Methyl alcohol and acetic acid obtained from the distillation of wood are important as chemical sources for these new products. Waste liquors from sulphite process wood pulp manufactures, a cause of much stream pollution in Pennsylvania, can be converted to material for plastics. Our forests which now lose up to 75 per cent of their products through fire, disease, logging and manufacturing waste, can be utilized to full productive capacity through the conversion of this waste.

Agricultural products, such as soy beans, and farm by-products such as grain hulls and straw as well as casein precipitated from skimmed milk, offer other sources for plastic materials. This fact is important to the farmers of the Commonwealth since Pennsylvania is one of the Nation's foremost agricultural and dairy States.

In addition to raw materials there are many industrial products required in the production of plastics, such as metals, fabrics, and paper. These are produced in Pennsylvania in large quantities.

The steel and metal industries of the Commonwealth are convenient to supply the metals which are used to an increasing extent for inserts, cores and reinforcing sheets in conjunction with plastics.

The special machines and equipment required in the manufacturing and fabrication of plastics can be supplied by the extensive machine tool industry of the State.

Fabrics are necessary in the making of many of the laminated plastics, which are used in increasing amounts for heavy duty purposes in industry. Some textile mills are already devoting their entire production to special fabrics for this purpose, and with the growth of the plastic industry, the many textile mills in this State are in a particularly good position to contribute to this development.

The paper mills of Pennsylvania are available to supply the increasing amount of paper also used in many laminated plastics.

Other manufacturing plants in Pennsylvania will, to a considerable degree, utilize plastic parts in the assembly of their own products. These many and varied industries throughout the State will provide an increasing market for plastic products produced in Pennsylvania.

THE MANUFACTURE OF PRIMARY MATERIALS

Heading the plastics industry are the primary manufacturers who produce the resins and compounds sold to fabricators. These primary materials are generally manufactured in large plants equipped to handle and control the delicate processes necessary to prepare the plastic material. The location of these plants will depend upon factors such as easy access to those raw materials found most abundantly in Pennsylvania, adequate labor resources, available transportation, accessibility to markets and ample supplies of pure water. The primary manufacturers either convert raw materials into plastics or depend on other manufacturers to furnish separate ingredients from which they compound the molding materials.

The primary plastics produced by these manufacturers are generally offered to independent fabricators engaged in the making of specialized plastic objects. These materials are offered in the form of molding powders, slabs, bars, and sheets.

FABRICATION OF PLASTICS (Secondary Manufactures)

The State's intensive industrial development, its ample transportation facilities and its proximity to the eastern industrial area are factors which make Pennsylvania well suited to the fabrication of plastic objects for all types of use. The field is so varied that there is opportunity for the manufacturer in smaller communities to produce specialized objects, and for the large manufacturer to fabricate the more complicated and extensive forms.

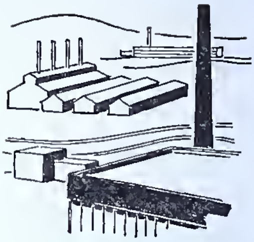
Machines for the fabrication of the more usual types of plastic products require provision for high steam pressure to heat the molds and compress the plastic materials.

Labor for plastic fabrication includes a complete range of skills—from the machine operator to the highly trained technician and engineer. Chemists, chemical engineers and mechanical engineers are needed to plan and control the process. Skilled die designers and highly skilled machinists are required in the making of the necessary dies and molds. Operators do not have to be skilled and can be readily trained on the job.

The secondary manufacturers usually fabricate plastic materials into products to the specifications and design of the consumer. Laminated material manufacturers either fabricate their products or supply the laminated materials to the industrial consumer who then fabricates his own parts.

Since the recent development of a self-contained unit for the extrusion of plastics, a new type of secondary material manufacturer has appeared who specializes only in extruded products.

Plastics in Other Industries



The substitution or alternate use of plastics for many objects now made of some other material is a matter of concern to the many industries now located in Pennsylvania. To meet future competition, either from the standpoint of attractiveness, durability, ease of assembly, or lower production costs, it is imperative that most manufacturers keep abreast of the developments being made in this material. The use of plastic equipment, because of its mechanical, chemical and electrical properties, or other advantages for specialized use, is also an important consideration which would require continual attention.

Claims have been made that there are over 100,000 different uses for plastics. Obviously it is impossible to attempt enumerating even a small portion of these many uses. The following list suggests only a few of these applications and provides a mere hint as to the potential competition which must be met by producers of other materials.

The Steel and Machine Industry

Plastics threaten to invade the field of many steel products.

It is worth noting, however, that a large amount of steel in plant equipment is necessary for production and fabrication of plastics. The development of machine tools for shaping plastics and the making of necessary steel molds and dies will undoubtedly increase in volume.

Many of the tools used in machining plastics, such as saws, drills, and lathes, are no different from those used for wood and soft metals. There are however, many machine tools such as presses, molding machines, automatic kettles, and grinders which are designed for plastics production alone. The steel molds used by the new industry not only require special steel, but also require specialized machining, which, in turn, has created a demand for new types of machine tools.

There is also a rapid advance in the use of metals to reinforce plastic products and in the use of plastics to improve the appearance or to protect the surface of metals.

Exceptional strength and durability is obtained by molding plastics over a steel core. The rust-proof surface and distinctive color are decided advantages over the metal used alone. Metal inserts of all descriptions are being developed with a plastic coating, put on either by dipping or by injection molding. The combined use of plastics and die castings give the product additional strength and at the same time a permanent attractive coloring. Steel plates having plastic surfaces permanently bonded to them are being increasingly used as material for wall surfaces, kitchen cabinets, and window sills.

The question will arise as to whether metal fabricators will take over plastics for their own use or plastic fabricators will take over metals. However, in either event, the combined use of metals and plastics requires progressive and collaborative action.

Certain of these new substances are finding increased use in machine design for gears and bushings and have become almost stock material for such heavy machine parts as the roll neck bearings used in the steel industry. Some of the applications mentioned in later paragraphs will undoubtedly displace a considerable amount of high grade and alloy steel.

The Lumber Industry

In many ways plastics are invading the lumber industry. Resin treated wood, and plastic-bound cellulose of many types are challenging many of the conventional uses of cut lumber. This undoubtedly will create problems of adjustment within the industry.

On the other hand, many plastics are so closely dependent on wood in some form, and wood by-products are becoming so important in the preparation of plastic material, that plastics will undoubtedly offer new opportunities to the lumber industry.

Within the industry itself the use of plastics for bearings, gear wheels, grease retainer rings, as well as other machine parts is increasing, and it is to be expected that further developments will contribute to improvements in machine design for wood working.

The Automobile Industry

The use of plastics in this industry has been steadily mounting. One manufacturer has developed an all-plastic body which may foreshadow future trends. Present day automobiles are fitted with plastic steering wheels, instrument board panels, safety glass, speedometer dials and numerous smaller fixtures such as knobs, buttons, handles, and ash tray covers. Other uses of plastics in the automobile are for brake linings, bushings, gaskets, generator housings, ignition parts, laminated gears, and pump shafts. Plastic gears have contributed to the almost noiseless performances of the car. In addition, the lacquers and finishes used for automobiles are generally made from a plastic base.

The Railroads

Although the railroads have not used plastics to a large extent, except in electrical apliances, linings for tank cars, and synthetic finishes, the newer coaches on stream lined trains give a hint as to future possibilities in the design of plastic fittings and fixtures on railroad, motor bus, steamship and airplane interiors. The greater use of safety glass on all moving vehicles is also to be expected.

The Aircraft Industry

Plastics have become extremely important in the construction of airplanes and there is every reason to believe this use will greatly increase.

At present the thermoplastic materials are more widely used than the thermosetting resins because they are more adaptable to series production. Expensive steel molds are not required, and the thermoplastics are more easily repaired.

Plastic sheet material has over twenty applications in one type of military plane, which include tail wing fairing, intake for heater, radio mast fairing, leading edge air inlet for oil cooler, transparent window and draft shields, gun turrets and propeller coverings. Extruded types are being used for conduits and ducts. Complicated objects such as boxes holding the collapsible rubber boats with their compressed air bottles are also made from this material.

The use of pre-formed plywood for the construction of an entire fuselage has become practical, and certain types of propeller blades are built up from compregnated wood.

Synthetic rubber, which must be considered to be a plastic of special properties, is used for fuel hoses, sheathing for cable, and as a lining for bullet-proof gasoline tanks.

The Building Industry

Plastic wall boards, which can be obtained in varied colors, have opened up new fields in the building industry. These boards give bright, permanent, easily cleaned finishes, resistant to both chemicals and sunlight.

The use of plywood (made with plastic adhesives) has also increased at a tremendous rate in the structural field for walls, girders, and trusses as well as in the construction of forms for concrete. Laminated plastics and plywood are finding increased use in the furniture industry. In the hands of competent designers, these new materials have produced objects of outstanding beauty and practicality.

Venetian blinds, bathroom and kitchen fixtures, knobs, door handles, switch plates, table tops, moldings, and floor tile are only a few of the architectural applications of plastics.

Plastic pipe and fittings to replace brass pipe are being used. Such pipe is easier to work and is only one fifth the weight of brass.

The Electrical Industry

The electrical industry can be said to have been the first big customer for plastics. They are used throughout every branch of electrical work including power transmissions, radio, telephone, telegraph, and television equipment. A few of the many uses are as covering for wire, as bases for switch boards and as battery cases.

The Chemical Industry

The chemical inertness of some of the plastics makes them particularly suitable for apparatus and containers for laboratory and industrial use. Plastic dishes, trays, containers, and other pieces of apparatus are common in the laboratory. The chemical industry uses plastics for pipelines, for tank linings, agitators, drip pans, precipitators, and other equipment subject to caustic and alkaline agents.

The Household Appliance Industry

The number of household appliances using plastics is apparent to every one and is almost limitless. Refrigerators, clocks, dishes, cupboards, electric razors, picture frames, and handles for all kinds of utensils are being partly or entirely made of this new synthetic material. Other objects such as card tables, lamps, book ends, toilet sets and paper baskets are also being made of plastics.

The Textile Industry

Plastics are replacing many of the parts used in textile machines which were formerly made of maple or other hard woods. Here the dense smooth surface of plastics is superior to polished wood or steel. Plastic tops for inspection tables are also being used to considerable extent in the textile industry.

The synthetic fibers such as nylon and rayon, have already opened new fields. Many textile plants are also making special fabrics for use in laminated plastics.

The Paper Industry

As with the chemical industry there are potential uses for plastics in paper mill equipment.

The making of laminated plastics requires special papers and with the growth of the industry, the demand for this product will undoubtedly increase.

The waste from sulphite process plants, consisting largely of lignin, has for many years been a serious stream pollution problem. In Europe these by-products are completely utilized and a considerable amount finds an outlet in the plastics industry.

The lignin in these by-products has found a limited market as a binder of soil for road construction, and as a component of molding sand. Experiments have been made which suggest a potential use of lignin in agriculture to improve physical properties of the soil and promote plant growth. The possible use of this product to improve soil for truck gardening and to prevent erosion on earth slopes along highways, deserves further research.

The Glass and Ceramics Industry

Many products formerly made only by the glass and ceramics industry are now being made of plastics. Certain properties now available in the transparent plastics are superior to those of glass.

Plastics are being used to an increasing extent for lighting reflectors and fixtures. Such fixtures are lighter in weight, have more resistance to breakage, and display a more even diffusion than does glass. Fixtures, if broken, do not have the jagged edges of glass fixtures. Plastic reflectors along highways are becoming widely used. Lights for airplanes and airports are being successfully made of plastics. The possibilities of variety in design and color, the safety factors, and ease of maintenance all contribute to what appears to be a very promising future in this field.

Plastics are finding a rapidly growing opportunity in the manufacture of lenses and other optical devices. Eye-glass frames have been made of plastics for many years. The use of plastics for lenses has been restricted however, because surface hardness has not been sufficient to prevent scratching and abrasion. This difficulty is gradually being overcome. Except for surface hardness, plastics are often superior to glass for lenses because of greater transparency and higher actinic value. There is also a growing field in the use of plastics for eye-ball contact lenses.

Some manufacturers claim that difficult and precision made lenses may be easily and economically cast for use in scientific instruments, as well as for eyeglasses. Lenses are now being made of plastics for reading and magnifying glasses, telescopes, and cameras, and a type of binocular is made up almost entirely of plastics. There has been a great increase in the use of plastics in lamp lenses and motor vehicle lenses.

Safety glass, consisting of a transparent adhesive plastic between two or more layers of glass, has been universally adopted by the automobile industry and is rapidly being adapted in the aviation, railroad, and boat industry and for architectural use wherever there is a danger of shattering.

Plastics alone are being used for many types of windows where non-shattering properties are desirable. Ultra-violet light is not stopped by plastic windows as it is by most kinds of glass and in addition the plastic windows are more readily shaped to irregular forms.

Bottles, and objects such as oil gauges are being made of plastics because of non-shattering properties. Transparent safety guards for machine tools have proved to have many advantages. Oil cans are being made of a translucent plastic which permits the contents of the can to be seen at all times.

If further developments are made in improving the surface hardness of plastics, serious inroads will undoubtedly be made on many products of the glass industry.

Plastics in the form of wall board, counter tops, and floor tile are being increasingly used in place of ceramic tile.

The Paint and Varnish Industry

Many of the plastics are finding eminently successful use as surface coatings in the form of varnishes, enamels or lacquers. Experiments have proven that the phenolic resins can be used to great advantage to prepare house paints which will stand up under the most severe weather conditions. These house paints retain their gloss better, do not crack, and stay white longer than most paints made of natural oils.

Casein water paints are being extensively used for interior decoration, and because these paints are quick drying and do not have the usual paint odor, there is every reason to believe that their use will increase.

Printing and Lithography

Although not in general use, plastics have been successfully employed for printing type. Printing plates for use on rotary presses and matrices for molding rubber plates can be made of plastics. A new process has been developed which utilizes plastics in the reproduction of half-tones in color.

Photography

In the field of photography, plastics have been important material for photographic film. Now, to an increasing extent, camera cases, developing trays, tripod fittings and cases, are being made of plastics. Large size photographic trays and parts of automatic developing machines are made of synthetic materials which have proved to be unaffected by the action of chemicals used in photography.

Closures

In the large field of closures, which includes covers and stoppers such as can covers, jar tops, and all kinds of bottle stoppers, plastics are gradually taking the place of other materials, particularly of cork. Lithographing, printing, and embossing is readily done on plastic tops to decorate and identify these closures.

Miscellaneous Uses

Plastics are replacing the lead seals which have been used for the sealing of packages, instruments and machinery, as well as for the sealing of freight car doors.

Patterns for cutting leather in the shoe industry are now being made of a thin transparent plastic which permits much greater cutting speed and less error. Familiar objects such as playing cards, ash trays, golf tees, costume jewelry, combs and fancy goods of all descriptions are being made from plastics. Plastic brushes complete with bristles molded by a single molding operation have become commonplace.

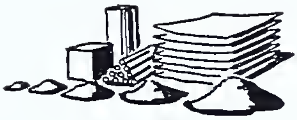
Musical instruments, particularly the wood winds, are being made of plastics. In addition, reeds, picks, mouthpieces, and many other items are being successfully made. The major use of plastics in the musical filed, however, is in the manufacture of records, not only for the home photograph but also for broadcasting and transcription.

Plastics have contributed much to the development of playground equipment where they are supplementing the use of wood for swings, slides, and various types of exercisers. Thus used they eliminate the problems of wood splinters and seasonal painting. Metal parts are often protected by a heavy plastic coating and wood slides are also protected by impregnation with plastic resins.

In the dental field, plastics are used for dentures, dental instruments, parts of x-ray machines and dental chair fittings.

Plastics with a filler such as graphite have proven successful for many kinds of self-lubricating bearings.

Kinds of Plastics



There are many different kinds of plastic materials now on the market, each of which has distinct and valuable properties.

These substances are divided into two general types: Thermosetting and Thermoplastic. As their name implies, the thermosetting plastics become "permanently set" after molding with heat and cannot be returned to a plastic state. The thermoplastics, on the other hand, although retaining their form under normal temperatures, can be softened by heating and can be remolded.

The thermosetting plastics are generally used with a filler such as wood flour, asbestos, mica, and cotton flock or with a material which can be laminated; such as paper, fabric and wood. The thermoplastics are used, as a rule, without fillers.

The more generally used plastics can be classified according to the following major groups:

Phenolic Group (thermosetting)
  Phenol-formaldehyde resins
  Phenol-furfural resins (and others)

Urea Group (thermosetting)
  Urea-formaldehyde resins (and others)

Cellulose Group (thermoplastic)
  Cellulose acetate binder
  Cellulose nitrate binder (and others)

Vinyl Group (thermoplastic)
  Vinyl resins
  Styrene resins
  Acrylic resins (and others)

Protein Group
- Casein binder (thermoplastic)
- Lignin binder (thermosetting)
- (and others)

Cumarone-Indene
- Cumarone-Indene resins (thermoplastic)

Alkyd Group (thermoplastic)
- Alkyd resins (and others)

Many distinct properties for each type have been developed by using the different fillers, laminating materials, plasticizers, dyes and pigments and by modification in the chemical content of these various types. Such properties include special thermal, chemical, and electrical characteristics; resistance to water, air, sunlight and aging, elasticity, impact and tensile strength, transparency, color, as well as adaptability to special problems in molding, shaping and machining. Because of the many properties found among these materials, it is important that careful consideration be given to the choice of a kind best fitted for each specific purpose.

There are over 250 different trade names for plastics. Some of these names are used for only one kind of plastic while others are used for many different types produced by one company. Only a few can be listed in the following sections.

PHENOL-FORMALDEHYDE RESINS are most often used for general utility purposes.

Molding Powders consisting of phenolic resins with wood flour filler are used for general molded objects. Other types of fillers such as asbestos, mica, cotton flock, or graphite, are used when special thermal, electrical, chemical, mechanical or lubricating properties are desired.

Cast Resins are used for simple objects requiring simple molds. The cast resins are convenient and can be used with inexpensive equipment. Cast resins in the form of bars and slabs are used for objects formed by machining.

Laminated Plastics consisting of paper, fabric, or wood sheets impregnated with phenolic resins and compressed together, are used where extra strength is required, as in table tops, machine parts such as bearings and gears, and for structural use.

Although phenolic resins can be used with pigments they are most often used in their natural colors, ranging from black to mottled brown.

(See chart, page 31, for typical developments in the use of Phenol-formaldehyde resins.)

Typical Trade Names

Cast	Molded	Laminated
Bakelite	Bakelite	Dilecto
Catalin	Durez	Formica
Gemstone	Haveg	Lamicoid
Marblette	Resinox	Micarta
	Arcolite	Textolite
	Durite	Taylor

PHENOL-FURFURAL RESINS, obtained from phenol and grain and woody fiber products, are similar in most characteristics to the phenol formaldehyde plastics, and are also used with fillers and laminating materials. These resins are gaining commercial significance because the grain husks and farm by-products from which they are made are a plentiful and inexpensive source of raw materials.

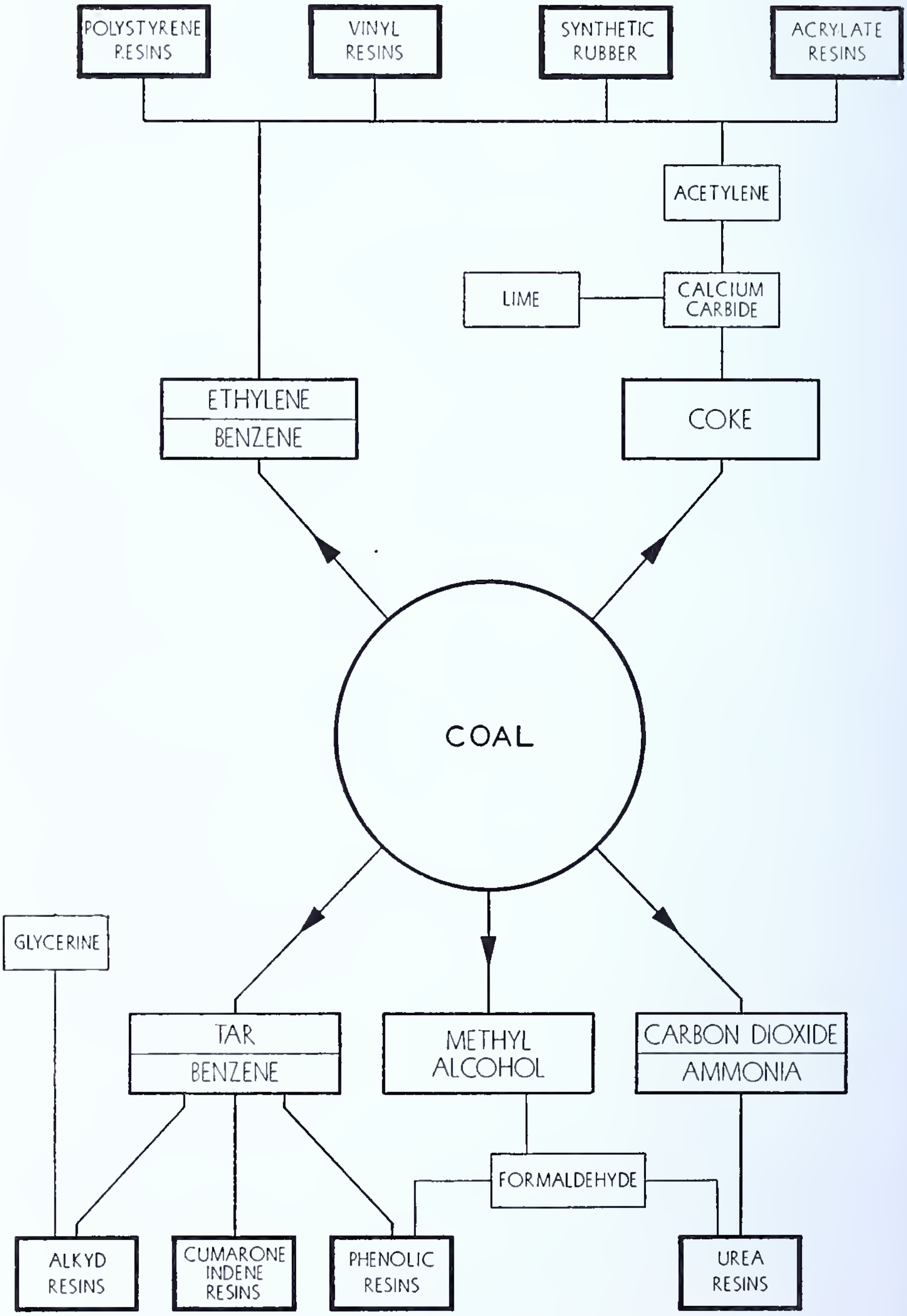
At present the furfurals have some disadvantages, a slower rate of reaction than the phenol-formaldehyde resins, and a naturally dark color. Research is, however, gradually overcoming these limitations.

The free flowing characteristics of the furfurals makes them particularly adaptable to injection molding. Because of their strength they are well suited as a binder for abrasive wheels.

Principal Trade Name

Durite

A FEW PLASTICS DERIVED FROM COAL



UREA-FORMALDEHYDE RESINS are used in a way similar to the phenolic resins. Their light color makes them adaptable to a wide range of coloring. They are most often used where color is a deciding factor.

Typical Trade Names

Beetle
Beckamine
Plaskon
RHouite
Uformite
Micarta

CELLULOSE NITRATE, better known as celluloid, appears on the market in the form of sheets, rods and tubes. Though the high inflammability of cellulose nitrate restricts its use, the ease with which it is molded makes it a good material for many fancy-goods and toys. Commercial movie film is usually made of celluloid.

Typical Trade Names

Celluloid
Nixonoid
Kodaloid
Pyraline

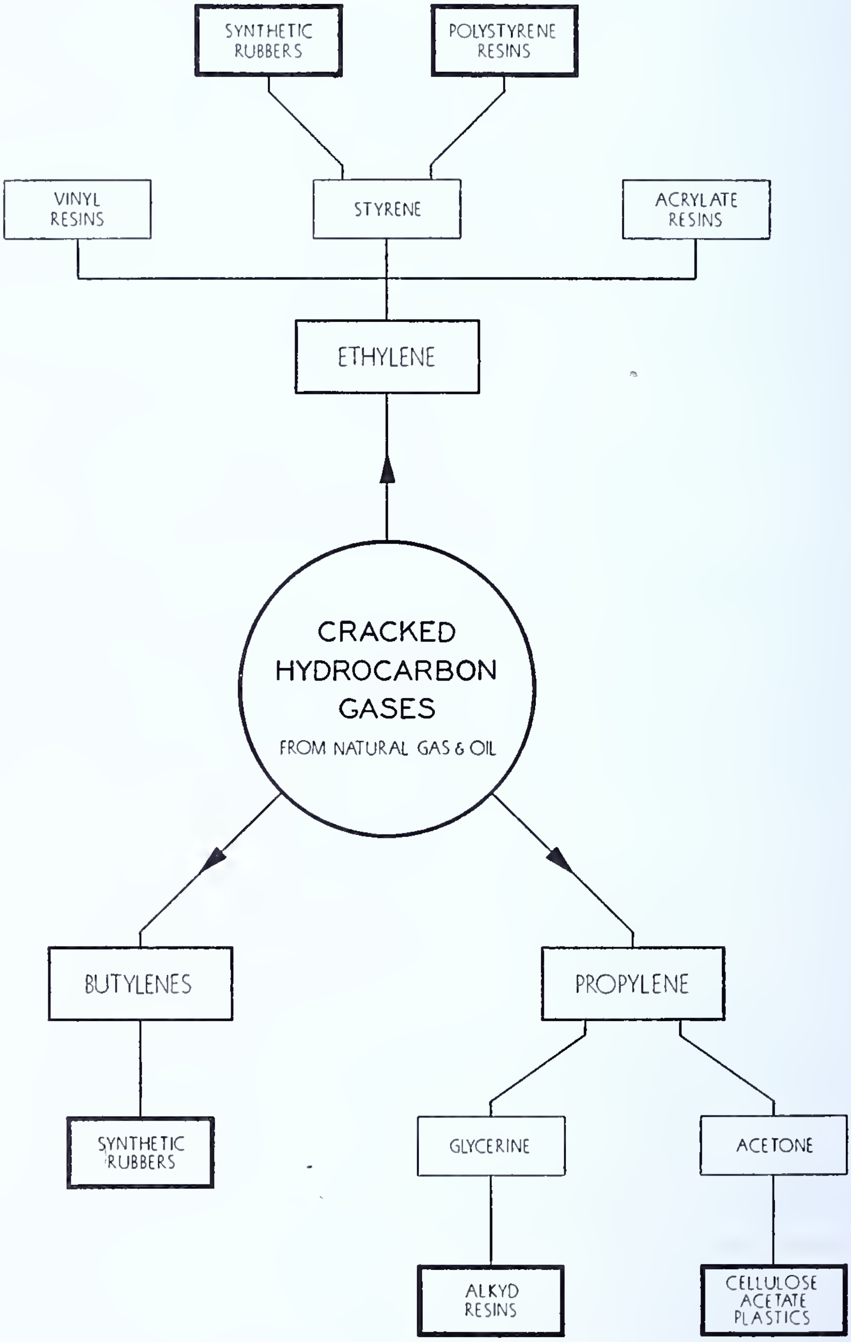
CELLULOSE ACETATE in the form of sheets and molding powder has become an important product which has properties similar to celluloid, but is non-inflammable. Brilliant colors, transparent, translucent, or opaque, are readily used. It is claimed that the resistance to impact of the acetates is unexcelled by any other molding compound.

Typical Trade Names

Lumarith
Plastacele
Nixonite
Tenite I

"VINYL" RESINS have developed amazingly in the past five years. There is a considerable range in these plastics, ranging from a soft rubber-like product to a substance harder than wood. Their resistance to chemical action, their low water absorption, toughness and electrical properties, make them valuable to industry. Their use for cable sheathing is now wide-spread. Other uses are in floor coverings, phonograph records, and in pipes for special fluids.

A FEW PLASTICS DERIVED FROM NATURAL GAS & OIL



Typical Trade Names

Vinylite	Bufvar	Vinal

"STYRENE" RESINS are offered as white powders, which, when compressed in a mold, form a transparent substance resembling cellulose acetate. Although these resins are somewhat more brittle than cellulose acetate, their great resistance to water and excellent electrical properties make them a good material for high frequency and transmission cable equipment. Fairly high in price, their adaptability for high speed production sometimes reduces the final cost. They are also used for manufacture of fancy-goods, toys and bottle caps.

Typical Trade Names

Styron	Lustron
Bakelite Polystrene	Resovin (dentures)

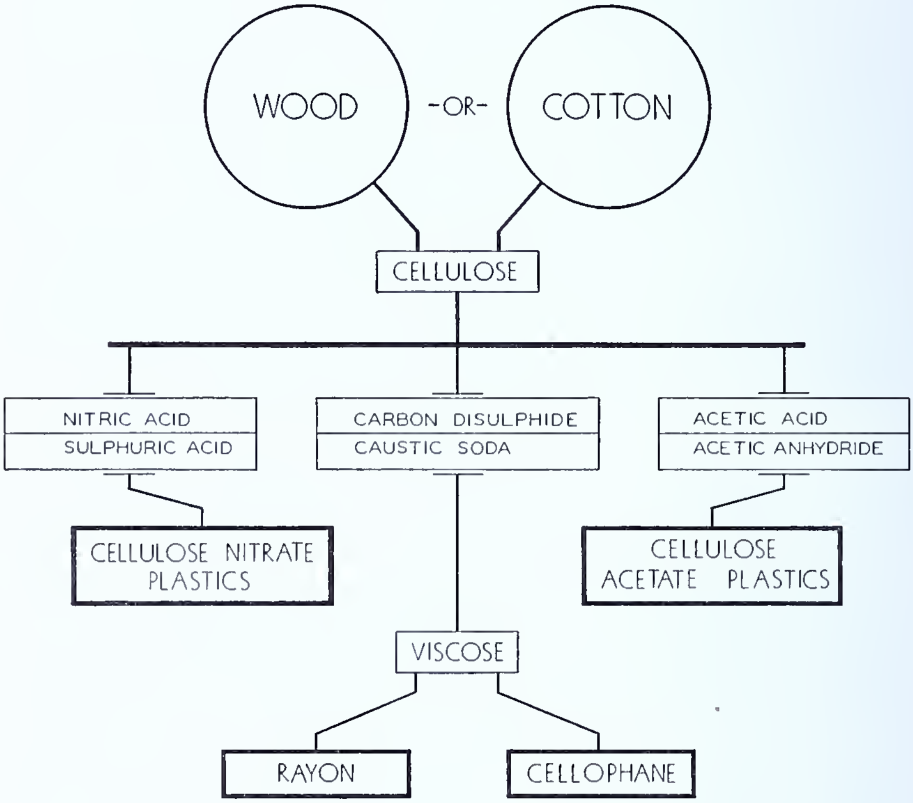
"ACRYLIC" RESINS are particularly well known for their optical properties and are offered to the fabricator in powder, sheet, or cast rod form. They are optically clearer than glass, and except for lack of surface hardness, are often superior to glass for optical use. In sheet form they can be shaped like cellulose acetate and have become widely used for airplane gun turrets and wind screens.

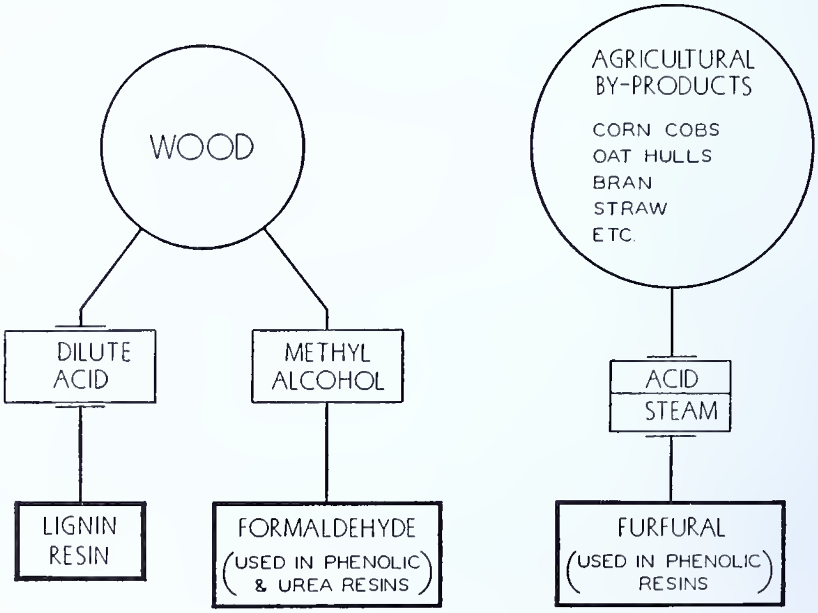
Typical Trade Names

Plexiglas	Acryloid (coatings)
Lucite	Plexigum
Crystalite	Primal
Crystalex	RHoplex

CASEIN is derived from milk, and although it has little or no application in heavy industry, it is used in the fancy-goods trade where its cheapness and beauty of texture make it desirable. The high water absorption of casein limits its use. Casein has become important in the preparation of water paints which are being increasingly used for interior finishing. Casein glue has become a widely used adhesive.

A FEW PLASTICS DERIVED FROM WOOD, COTTON & AGRICULTURAL BY-PRODUCTS





Typical Trade Names

Ameroid
Gala
Galorn
Lauxtex

LIGNIN PLASTICS are similar to the black commercial phenolics in appearance and properties. Experiments are progressing in the development of this plastic which promises to be cheap because 85% of the material can be prepared from wood and agricultural waste products.

CUMARONE-INDENE resins are most useful to engineers as modifying materials for molding compositions, and surface coatings. Products range from mastic floor tiles to printing inks.

Typical Trade Names

G. Resin
Cumar
Neville Resin
Nevindene
Phenester
Piccoumaron

ALKYD RESINS are extensively used in paints, varnishes and lacquers. These resins are most often modified by the use of oils and other resins. The molding use of these resins is limited. Alkyds are, however, used in some cold molding preparations. Resistance to high temperatures is an outstanding characteristic.

Typical Trade Names

Amberlac
Aquaplex
Duraplex
Paraplex

OTHER PLASTICS AND BORDERLINE MATERIALS

Many materials that are partly or entirely a form of plastics are usually considered separately because of their specific properties or use. Such materials include synthetic yarns, synthetic rubbers, plywood coatings, and natural resins.

Synthetic Fibers—Rayon and nylon are types of plastic material which have invaded the textile market and have received wide recognition for their strength and elasticity. These plastics also find use in water repellant brushes. Another material, vinyon, is gaining recognition and is used in such objects as belts, suspenders, rain coats and ladies' shoes.

Cellophane—Cellophane, a viscose derivative, is well known as a wrapping material.

Wood and Plastics—Laminated plastics consisting of paper, fabric, asbestos, or wood sheets bonded together with resins have been previously referred to; however, the various uses of laminated wood justify separate consideration.

Laminated wood using a plastic resin can be considered as having several distinct forms—plywood, pre-molded plywood, impregnated wood, and compregnated wood.

Resin bonded plywood—For many years the adhesives available for plywood did not produce panels of any degree of uniformity. However the use of thermosetting resins to bond thin sheets of wood has developed a new material impervious to moisture, bacteria, and fungi. This material, in flat sheets, combines uniform strength with large size and is finding widespread application in all forms of construction.

Pre-molded Plywood—For curved objects, strips of thin wood veneer are shaped over forms in numerous layers. Thermosetting resins are used to bond these layers and under heat and pressure, strong and light plywood products can be made which reproduce the curvatures formerly obtained only in metal. The strength to weight ratio and the resistance to corrosion and fatigue of this material have made it particularly adaptable to airplane construction.

Resin Impregnated Wood—Wood impregnated with resin, then laminated and molded into large curved shapes, has become a new material which offers many advantages not found in metal. Everything from boats and bathtubs to kitchen equipment is being made from this form of laminated wood and there appear to be great opportunities in its future use.

Resin Compregnated Wood — Wood impregnated and laminated with resin and compressed under great pressure forms still another type of "wood-plastic" material. The resulting product is one of great hardness, density and strength. Some types of airplane propellers are being successfully made of this material.

Plastic Coatings—Some of the plastics dissolved in an appropriate solvent form the basis of many of the varnishes and lacquer finishes we know of today. Also special coatings of plastics make an excellent insulation material for wire.

Rubber and Rubber Like Materials—The rise in importance of synthetic rubber is well known to all, and it is impossible to predict the future impact that its production may have upon the world. Special properties of some types of synthetic rubber, particularly their resistance to oil and gasoline, have made them superior to natural rubber for certain uses. Synthetic rubber also has more resistance to the effects of light, heat and oxygen than the natural rubber.

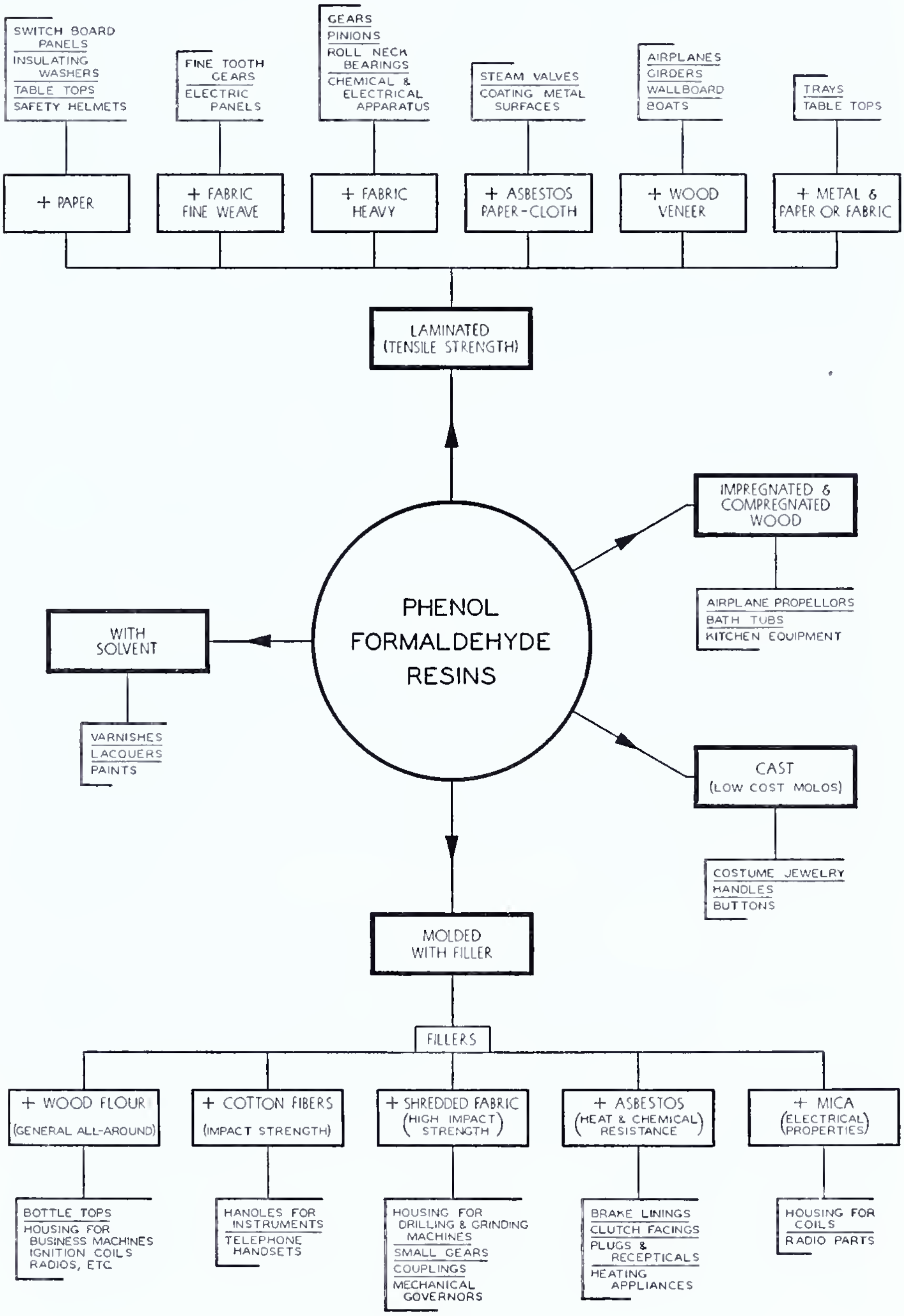
Natural Resins—Because of the developments in hot molding, and the varying quality of natural resins, there has been a decline in their use in favor of the more expensive synthetic resins. Considerable progress has been made in improving the quality of natural resins and some of the lost market has been regained. In this group of natural resins are shellac, copal, amber, and the asphalts.

Miscellaneous Materials—Many of the resins used in plastics are an important part of other widely used materials such as: adhesive, corking and sealing compounds, foundry core binders, linoleum, and mastic floor tile.

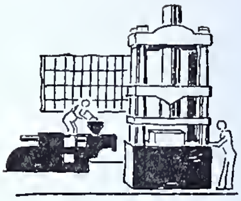
SOME APPLICATIONS OF PHENOL-FORMALDEHYDE RESINS

Acid-proof linings
Ammeter cases
Anti-friction bearings
Armature coil casings
Armature distribution blocks
Balls for bearings and clutches
Banjo frames
Beads
Billiard balls
Bobbins
Bowls
Boxes
Brake couplings
Brake linings
Brush handles
Buttons
Cable branching boxes
Calculating machine parts
Camera bodies
Candlesticks
Castanets
Castors
Chandeliers
Chemical apparatus
Cigar and cigarette holders
Clock cases
Closet seats
Condensers
Counters
Costume jewelry
Dental instruments
Dice
Electric drill parts
Electric piano parts
Enamels
Equipment for doctors and dentists
Fan supports
Fire extinguishers
Fishing reels
Gear wheels for motors and machinery
Glove fasteners
Gramaphone discs
Grinding discs
Gun stocks
Handles (all kinds)
High voltage insulators
Ignition coil casing
Insulators
Lamp sockets
Magnetos
Packing rings
Paint brush cement
Parts of office machinery
Piano keys
Picture frames
Pipe lines
Pistons
Printing blocks
Pumps
Radio parts
Razor handles
Safety spectacle frames
Socket cement
Spinning pots
Stoppers
Surgical instruments
Switch sockets
Switchboards
Telephone parts
Tile impregnation
Transformer parts
Typewriter parts
Valve seatings
Varnishes
Violin parts
Wall coatings
Washing machine stirrers
X-ray tubes

TYPICAL DEVELOPMENTS IN THE USE OF A THERMOSETTING RESIN



Fabrication of Plastics



Consideration must be given not only to the inherent characteristics of each type of plastic but also to the many methods of fabrication. Each method has certain advantages depending upon the type of plastic used, the requirements of the object produced and the quantities to be made. It is important that all products be carefully and appropriately designed with reference to the fabrication method to be employed.

The several distinct methods of fabrication of plastics are as follows:

Blowing—Many hollow fancy goods and toys are produced by placing two heated sheets of plastic in a mold and injecting air between them which then presses the sheets to the form of the mold and joins them at the edges.

Shaping—In general the shaping of thin sheets of plastic is accomplished by stretching pre-heated sheets over hard wood molds and holding them in place with hardwood jigs. It is by this process that gun turrets, ventilator ducts and similar large complicated shapes are formed. Sheets over one square yard require special equipment and large themostatically controlled ovens.

Extrusion—In this method the plastic is forced through a pre-heated die by means of a plunger. These dies are shaped to the cross section of the object required and the material, after being forced through this shape, becomes hardened in long strips. Tubing and hollow forms are made by using a concentric mandril.

Compression Molding—A molding compound, generally in the form of molding powder, is placed in one section of a heated mold. The other section of the mold compresses the molded powder into the required shape. After the chemical reaction has taken place, the pressure is released and the mold reopened.

Transfer Molding—In transfer molding, thermosetting material is compressed to a fluid state in a cylinder attached to the heated mold. Through a small opening in this cylinder the fluid is forced into the mold cavity. The pressure is maintained until the material has hardened in the mold.

Cold Molding—In cold molding there is no provision for heating the mold. The process merely compresses the cold molding compound to the finished shape desired. The pieces are then removed to ovens for the hardening and tempering process used to "set" the binder.

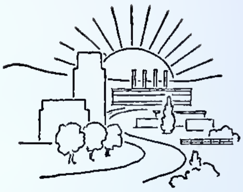
Injection Molding—Injection molding is quite similar to transfer molding. The fluid material, a thermoplastic, is forced into the mold cavity through a small connecting opening. The mold is maintained at a low temperature which reduces the time of the molding cycle.

Casting—Casting is often used for simple objects requiring little expenditure for precision molds and dies. Molten plastic is poured in molds of lead, or even of glass which is later broken off. Bars, slabs, and sheets are cast in simple forms for machining into the finished product. Cast surfaces require polishing.

Machining—All plastics can be machined. Some, however, are more adaptable to this process than others. In general the thermoplastics are more readily machined than the thermosetting plastics, particularly those containing fillers.

All the thermoplastics can be bevelled with rotary cutters, cut with guillotines, and punched, sawed, and drilled by standard machines and tools. Filing and turning is done in the same manner as with wood. Laminated plastics are usually machined in the same way as wood or soft metal.

Plastics and the Future



In spite of the developments that are being made in the field of plastics it cannot be assumed that plastics will make obsolete the many materials to which they appear to be strong competitors.

It may be possible that plastics will be developed which have the surface hardness, elasticity, temperature resistance, and strength per unit area of the metals, but it is doubtful that such plastics will be able to compete with steel in most applications, particularly for heavy machine and industrial use.

Chemical technology may some day create plastics having the surface hardness of glass. If this becomes true, plastics will invade the glass industry to a considerable degree but special heat resistance properties, and non-shattering properties are being developed in glass which will enable that material to retain much of its old field and gain new avenues of usefulness. Likewise the increased use of glass, in building construction has opened new possibilities still in their early stages of development.

A similar loss in some applications, and a compensating gain in new uses will undoubtedly be part of the adjustment that will be necessary for many industrial materials if the coming "plastics age" develops as now anticipated. The extent to which these changes will affect any specific industry will depend largely upon the progressiveness and united effort put forth by that industry in perfecting its products and using them to best advantage.

Within the plastics industry there will be keen competition, not only in the development of new and more specialized properties, but in the use of the more abundant and cheaper raw materials. Raw materials such as coal, oil, wood, cotton and other agricultural products and by-products will be subject to competitive pressures. The extent to which any may dominate will depend upon their respective advantages and economies of use or transportation. The various methods of fabrication such as molding, casting, and extrusion will also continue to compete in the struggle for lower production costs.

Plastics can also expect increased competition from the light metals. The vast capacity now developed for the production of light metals for war use will undoubtedly make these metals available for the fabrication of many objects now made from plastics. This potential effect of light metals on the plastics industry cannot be overlooked.

The science of electronics has developed new devices for heating molding powders by means of high frequency radio waves. Not only does this new method cut down the molding time for large thick objects from 20 minutes to 2 or 3 minutes, but the even heating that is obtained eliminates many of the risks of flaws. It is expected many changes in molding technique will be brought about with further development in this field.

Experiments are being made in a "plastic foam" so light that a six-foot section can be held up with one finger. It is expected that it will have wide use as an insulating material for walls of planes.

Claims have been advanced that plastic adhesives can be used to join metals even more effectively than by means of rivets. If further experiments and developments support these claims, many of the present methods of fabrication may be entirely revolutionized.

Such competition between new and old materials and new and old methods of production and use will be keen, and will necessitate careful study by each industry to examine the limits and possibilities of its materials and to apply those materials to the products to which they are best fitted. In such developments the plastics industry as well as other industries of Pennsylvania have much to contribute and much to gain.

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Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols., 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.

*Air Photography, November, 1940.

*Defense Problems, January-March, 1941.

*Post Defense Problems, April-June, 1941.

Index of Publications, August, 1941.

*Community Self-Appraisal, September-October, 1941.

*Self-Appraisal for Increased Production, November, 1941-January, 1942.

*Community Self-Appraisal (Revised Edition), April, 1942.

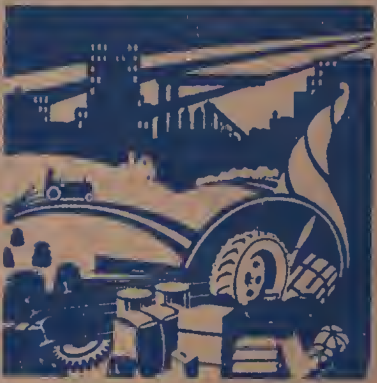
*Comparative County Data, May, 1942.

*Planning and Zoning Progress in Pennsylvania, July, 1942.

*Population, October, 1942.

*Handicrafts in Post-War Planning, May, 1943.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.



SYLVANIA PLANNING

AIR PHOTOGRAPHS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

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FEBRUARY 1944

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To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

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The Bird's Eye View

❡ Air photography predates the invention of the airplane by many years. Long before the Wright Brothers made their historic hop at Kitty Hawk, cameras had been carried aloft on balloons and by the once famous tetrahedral kites of Alexander Graham Bell.

❡ One of the first and most astonishing discoveries made when the use of air photography became wide-spread was the fact that many important features of our history and of our land use, which had never been detected with any ordinary methods of examination, were made instantly clear through the inspection of air photographs. In the Ohio Valley the sites of ancient Indian mounds and villages were visible from the air long after all traces of them had been obliterated by plowing and by forest growth. On the Carolina coast air photographs detected the record of what may have been a great world catastrophe of early times—the fall of a huge swarm of meteors whose craters are still visible when seen from high in the air.

❡ Applied to more prosaic scenes and problems these photographs have led to other discoveries not so dramatic but of larger economic importance to the communities of Pennsylvania. Areas of land not recorded on any local assessor's books and even, in one important case in the West, a large tract without any recorded owner, have been detected through a comparison of air photographs with existing tax maps.

❡ Some hint as to the immense variety of the physical features of our State may be gained from a series of Pennsylvania air photographs presented in this issue. While the interpretation of many of the characteristics of our landscape, as seen from above, is sometimes a matter which requires an expert eye, it will be evident, even from a casual glance at these pictures, that a new device is now in our hands giving important aid in dealing with the complex problems of our forests and streams, our agriculture, our industries, and our towns and cities.

Air Photography in War and Post-War Planning

In 1937 a program for the aerial photography of the entire surface of Pennsylvania was urged by the State Planning Board. In 1939 the program was authorized and funds provided. This project was finally completed in June, 1941.

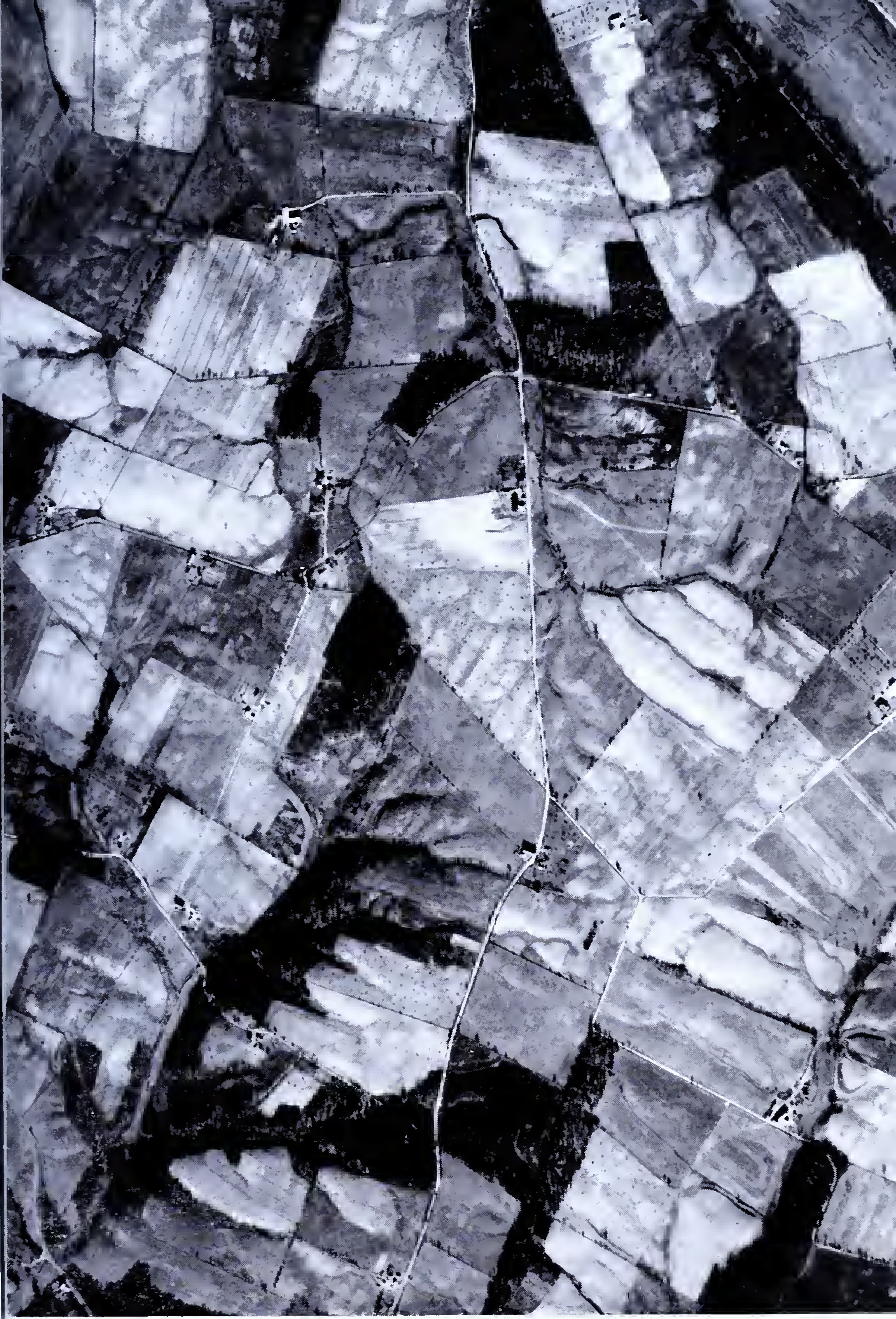
Six months later the United States was at war.

Throughout the past two years the existence of this complete file of air photographs has been an important means of expediting the location of war plants. It has saved weeks and perhaps months of field work in determining areas best suited for various types of military installation and has enabled the Federal Government and our various local governing bodies, as well as our public utility companies, to lay out routes for highways, pipe lines, telephone and electric power wires, and extensions of railroad rights-of-way. Private industries in search of suitable locations for the manufacture of military supplies have found the air maps of our Commonwealth to be invaluable.

The State Highway Department has made extensive use of these photographs in connection with its highway planning program. Geologists have found them important in conducting preliminary field investigations. Owners of private forests have made use of them in laying out scientific cutting programs. Penal institutions have made use of the State's air maps to direct the search for escaped convicts. The United States Army has found them essential in planning military defenses.

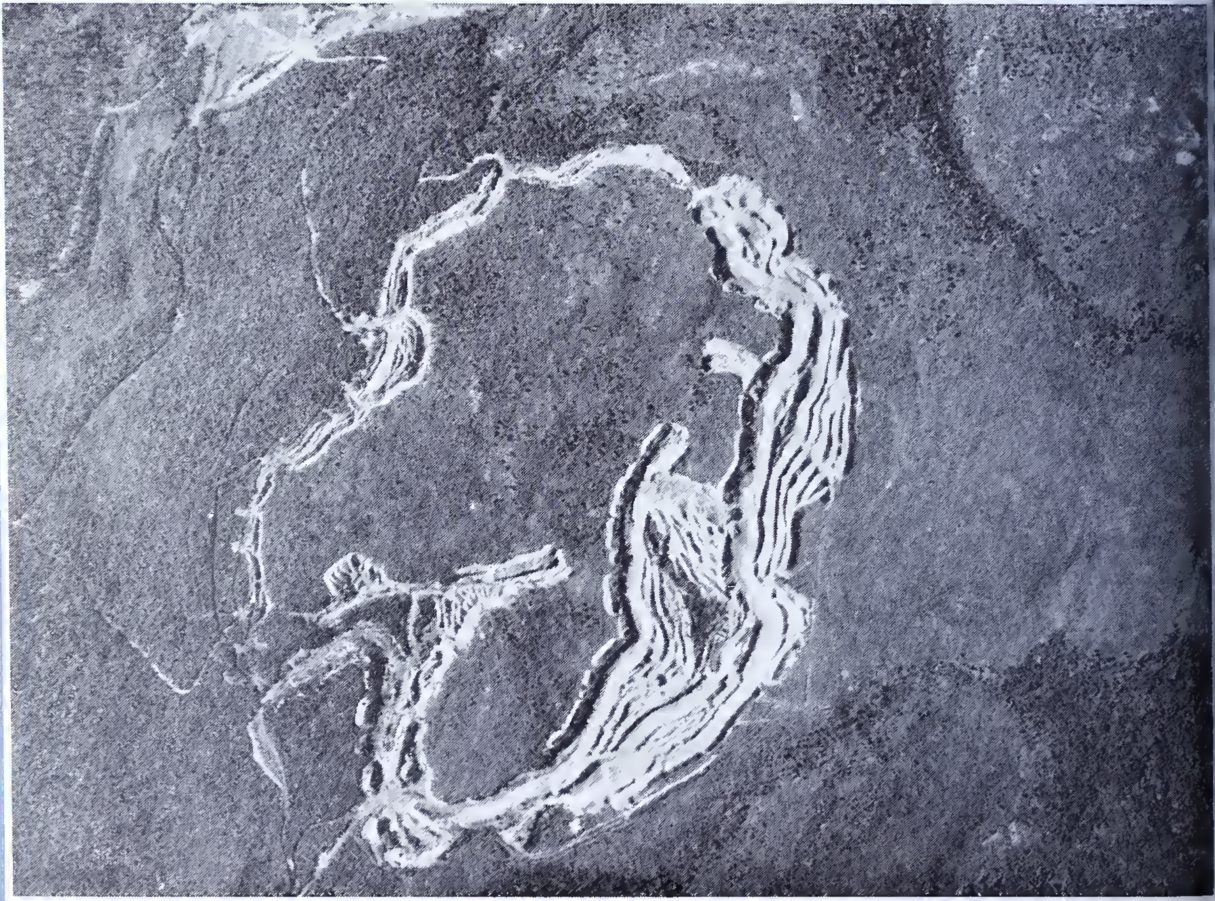
In many of our State's communities directly affected by the growth of defense industry the use of air photographs has been of vital importance in planning needed public facilities and emergency housing, necessary for the war effort. Other towns and cities are finding the photographs in the form of mosaic maps, indispensable in zoning work and in making comprehensive plans. Allegheny County, faced with an immense war boom, has made use of air photographs in connection with vital land-use planning and allocation of public facilities.

Long range plans made in times of peace have thus resulted in our possession of this most valuable weapon of war. The lesson of that fact is plain and unmistakable. During these years of National war effort our preparations for the years of peace are no less urgent. The planning and zoning programs which have been made necessary, in many of our communities, by the problems of war will need to be extended to all our counties, boroughs, cities, and townships if we are to meet properly the challenge of a peace which may arrive just as suddenly and unexpectedly, and with just as serious and immediate problems, as those which confronted our Country and our State the day after December 7, 1941.

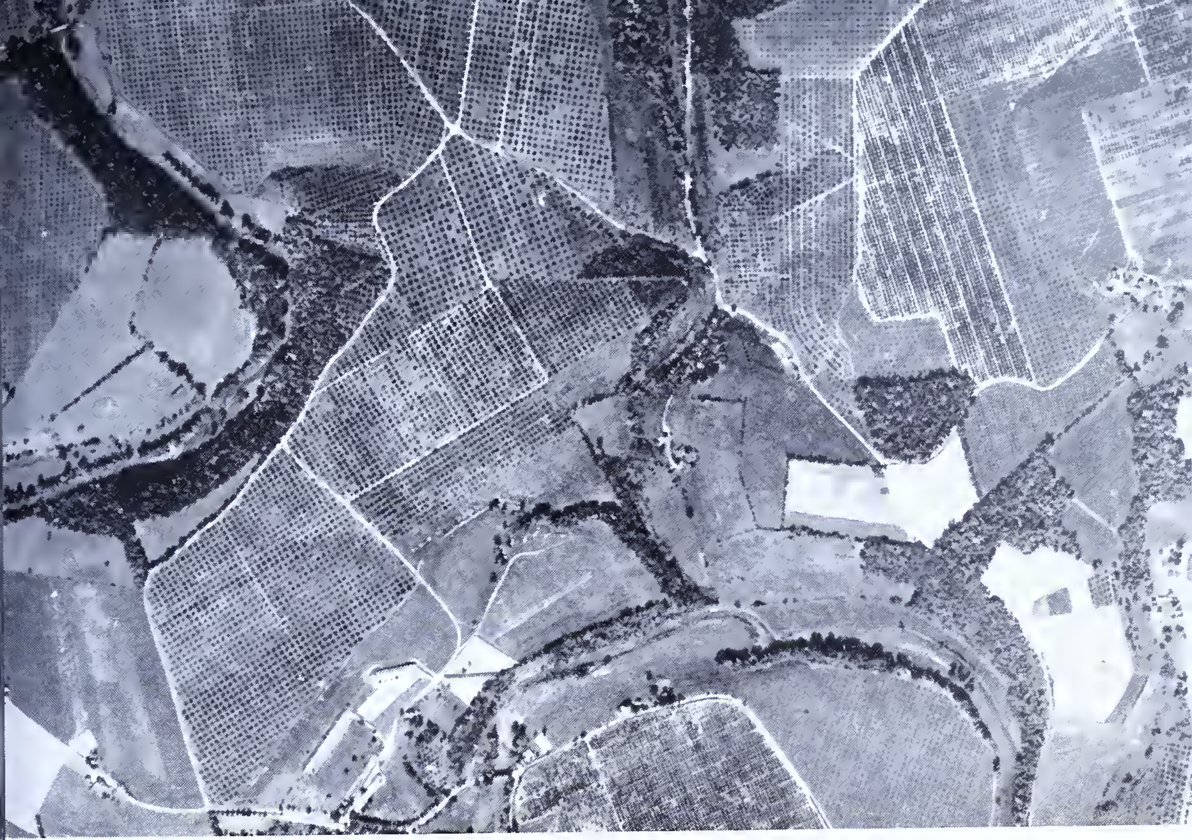


Gully erosion as seen from the air

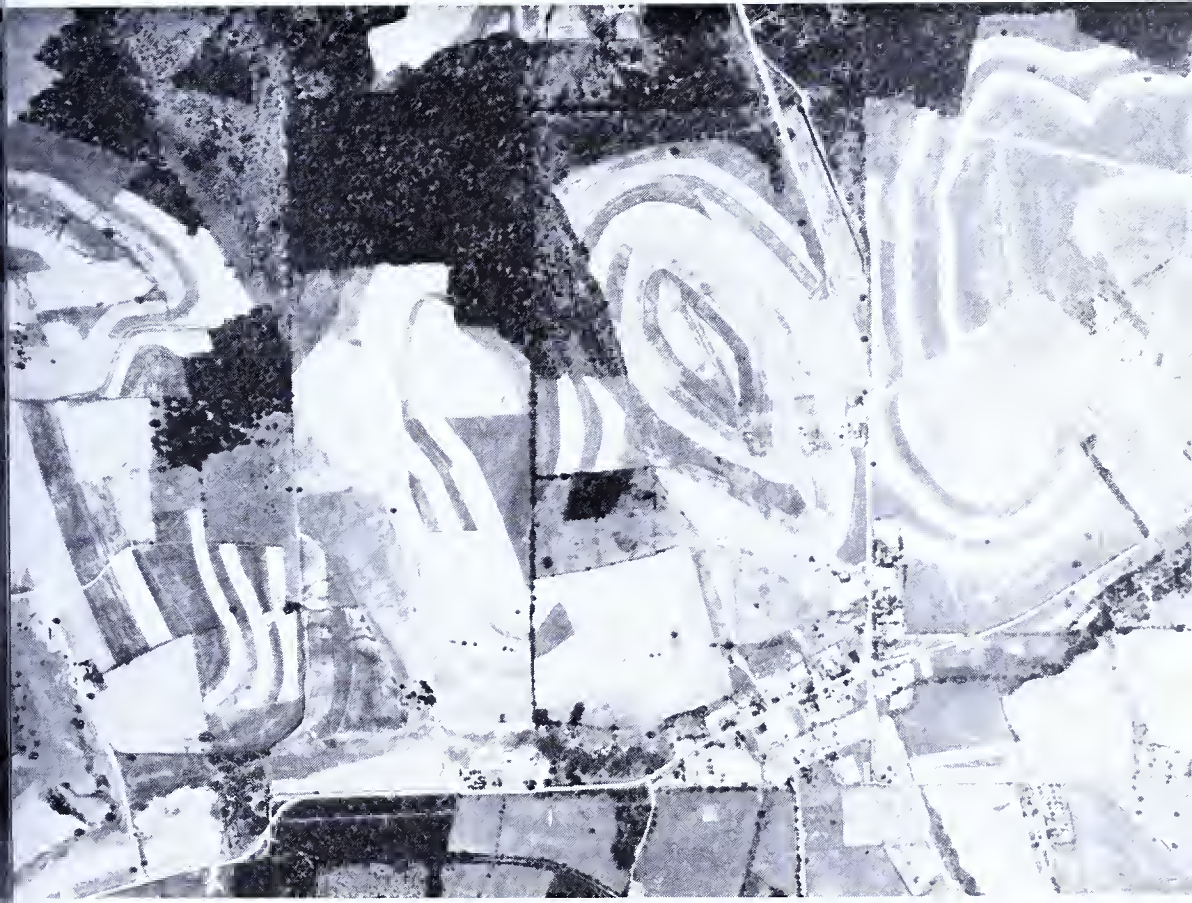
An anthracite coal mine creates this surrealist sculpture



The earth worm pattern of a strip mine

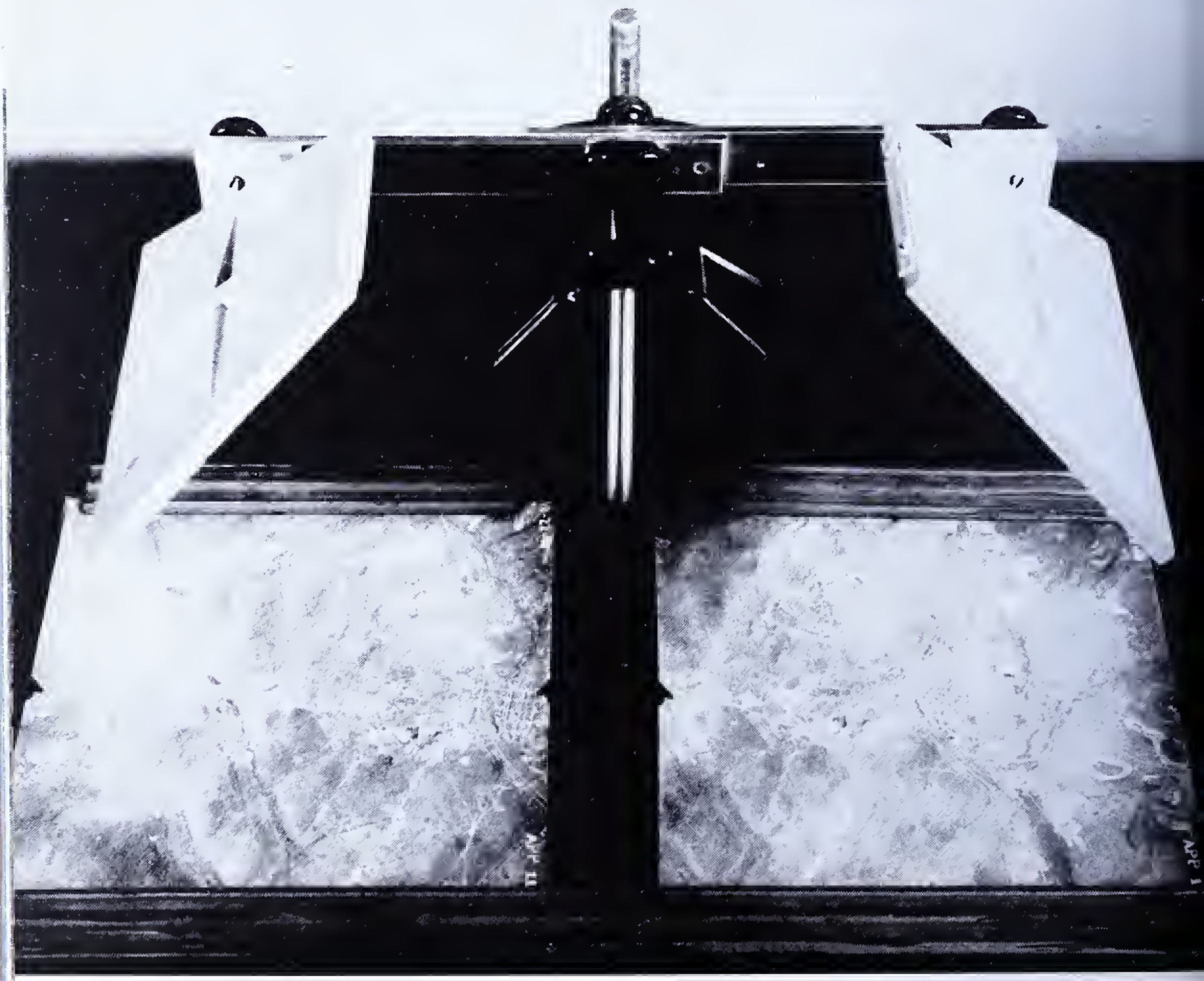


Patterns woven by orchard trees



Contour plowing draws these strange symbols

Deep valleys in Pennsylvania's wooded hills



Mirror stereoscope for viewing air photographs

The Value
# of Air Photographs
in Solving Civic Problems

Many Pennsylvania communities have already made important use of the State's air photographs in laying the basis for their local post-war planning programs and in revising their tax assessment lists.

In Blair County a comprehensive classification of land use and values was recently completed by the School of Agriculture of Pennsylvania State College in which the County's air photographs were used as the basis for field investigation.

Crawford County has employed photographs in the preparation of a county zoning ordinance and in its county planning program, and has already discovered, through the checking of these photographs with tax maps, considerable areas of land not registered on assessors' lists.

The following letter from the Honorable Wesley G. Reitze, Chairman of the Crawford County Commissioners, explains the various aids and economies developed in that county through the use of air photographs. Because of its general interest to all civic officials the letter is presented in full:

COMMISSIONER'S OFFICE
Crawford County
Meadville, Pennsylvania

November 30, 1942.

Mr. F. A. Pitkin,
Executive Director,
State Planning Board,
Harrisburg, Pa.

Dear Sir:

I take this opportunity to say that the air photographs of Crawford County which were purchased recently through your office are proving to be of inestimable value to the county in many different ways. I have no hesitation in saying that although we have had them less than two months they have already produced enough revenue and saved enough time for the county to more than pay their cost.

We use air photographs in the management and sale of properties acquired by the county at tax sales. We find that they aid greatly in determining values. In many instances more information can be gotten, and better judgments formed, from an hour's study of an air photograph than from a day's inspection on the ground. They show the different kinds of uses—cultivated, pasture, timber, waste, etc., in their true sizes and shapes, and in proper relation to each other and to other properties in the vicinity. We have already been able, on one or two occasions, to secure higher prices for property sold than the original bids which we might have been inclined to accept if we had not had the information obtained from air photographs to enable us to bargain intelligently.

We find the air photographs useful in correcting errors in assessment, particularly in the matter of acreage. There are probably more errors in the descriptions and acreages of county owned land than of other properties, due to carelessness in copying. Air photographs furnish a quick and inexpensive means of discovering and correcting errors, which otherwise might not be detected, or might require a field survey.

In the use of air photographs in connection with the management and sale of county owned lands, we have already discovered several properties which were not assessed. Ordinarily these omissions are not disclosed by the records, but they are brought to light by the air photographs. We see to it that these lost properties will appear in next year's and subsequent assessment rolls.

Our main object in acquiring the air photographs was to use them in making a complete set of tax and assessment maps of the entire county. They have already proven their worth in that use. A large percentage of the properties are described in the deed only by bounds and acreage. The lines and corners of nearly any property can be identified from landmarks which show on the air photographs by a person familiar with the place, and the lines and angles can then be scaled and the acreage computed quickly. More information about property lines can be obtained from air photographs in half a day than can be gotten in a week by a surveying party.

There are deficiencies in many of the property descriptions which are given by courses and distances. The figures that are lacking can be obtained almost instantly, and with certainty, from an air photograph; whereas any other method of supplying deficiencies takes much time and (except in the case of a field survey) has the element of uncertainty.

Air photographs have other advantages in assessment work. Where different uses are assessed at different rates, the acreage of each kind can be obtained accurately and quickly from an air photograph, which is an improvement over the guesswork of past assessments. Another advantage is the fact that with the use of air maps all the acreage can be accounted for. It is a known fact that there is hardly a farm in the county, except those which have been surveyed recently, that does not contain more land, ranging from six to twenty per cent, than the old deeds call for. If for no other reason, the air photographs will justify their use by accounting for this surplus.

However, it is the opinion of the county authorities that the air photographs will not only pay for themselves, but will pay the entire cost of making the tax and assessment maps and setting up the new assessment system, by enabling them to detect and get back onto the assessment rolls the properties that at the present time are not being assessed at all. A reasonable estimate, based on the experience inaugurated in the county, and on our experience in the handling of properties acquired at tax sales, and our past two months' experience with the air photographs, is that we will discover at least 2,000 properties that are not paying taxes at the present time (as compared with 25,000 which are assessed). It is not necessary to discuss here the reason why they are omitted and have been for years. The exact number, location, nature and extent of these omissions will eventually be disclosed by the air maps.

It is reasonable to assume that when these lost and omitted properties are back on the rolls, the assessed valuation of the county will be increased by a sizable percentage, all of which can be credited to the air maps.

It might not be out of place to state that the only other method of accounting for all the property in the couny known to this writer is by a county-wide property line survey. He has repeatedly stated that such survey could not be done for less than $100,000, and probably would cost much more. Results, better in many respects, are being secured in Crawford County for less than one-twentieth of that amount by the use of air photographs.

Crawford County is at present concerned with the preparation of a Road Docket Index, in which it is proposed to show the location of every road which has ever been petitioned for, approved, disapproved, located, relocated or abandoned. Anyone who has ever tried to locate old roads from record descriptions, many of which refer to landmarks long since obliterated, realizes the difficulties involved unless some key is found. We have already found a number of instances where roads which have been vacated for many years show up plainly on the air photographs, even when they cannot be seen on the ground.

Crawford County found the air photographs invaluable in the preparation of maps for the County Zoning Ordinance. The skeleton maps were traced directly from the air photographs. In making field surveys for the "existing use" maps and the list of non-conforming uses, the air photographs were taken out into the field, and all the essential information marked on them and then traced on the proper map. This method made it unnecessary to take measurements in the field, or to spend any great amount of time in plotting in the office. The air photographs also made it possible to determine the location, nature and extent of the various classes of zones more scientifically and quicker and cheaper than could done on the ground. It is hardly necessary to say that all our future planning and zoning will be based on air photographs. Our experience indicates that only by their use can the work be done properly and scientifically and at a feasible cost.

We do not believe that we have exhausted all the possibilities of the air maps. We will undoubtedly find future uses for them in ways that we have not thought of up to the present time.

In conclusion, we take this occasion to suggest that every county in the State should have a set of air photographs. They will prove to be the best investment a county could make.

You may use all or any part of this letter in any way that you see fit. We hope that it may be instrumental in inducing other counties to take advantage of the manifold opportunities afforded by air photographs.

Very truly yours,
CRAWFORD COUNTY COMMISSIONERS,
Wesley G. Reitze, Chairman.

Several municipalities recently adopting zoning ordinances, such as Lancaster and Manheim Townships, have found the use of the State's air photographs invaluable in the preparation of their general development plans and zoning ordinances, while the City of Erie, and also Bradford County are considering the use of these maps for correcting their real estate assessment tax lists.

While purchase of air photographs at this time is dependent upon the consent of the Army Intelligence Office, and the need for such photographs in the prosecution of the war effort must be proved, every Pennsylvania borough, city, township or county might well determine on the purchase of a complete set of air photographs as the first items in its post-war planning program. In most instances there will be no difficulty in obtaining "Army" consent for release of photographs, at least for local official use.

▲

The cost of air photographs is best illustrated by a concrete example. Crawford County, which has an area of 1,016 square miles is covered by 741 photographs. The location of these prints are shown on 17 photo index sheets. The contact prints, which are seven inches by nine inches are at a scale of one inch equals 1,667 feet. The prints overlap sufficiently for use with a stereoscope. Contact prints and photo index sheets for an area equal to that of Crawford County would cost approximately $125. These prints are not recommended for county planning or tax assessment purposes as the scale is comparatively small.

The more intensive the study to be made of an area, the more important it becomes to use enlargements of a scale adequate to show all necessary detail. On page 17 is illustrated a small section of a contact print and an enlargement of the same area. In such enlargements, individual houses and even smaller structures are readily discernible and comparative street and road widths may be determined with a fair degree of accuracy.

The cost of enlargements of 370 alternate prints, giving full non-stereoscopic coverage, and the necessary photo index sheets for an area approximating that of Crawford County at various scales is as follows:

1 inch equals 1,000 feet	$179.25
1 inch equals 800 feet	179.25
1 inch equals 600 feet	253.25
1 inch equals 500 feet	475.25
1 inch equals 400 feet	752.75

Information concerning the cost and number of prints required for any area in Pennsylvania can be obtained by writing to the Executive Director of the State Planning Board.

Practical Uses for Air Photographs

The cuts on pages 17-20 illustrate certain applications of air photographs to municipal planning and tax assessment.

In cut A, page 17, is shown an enlarged photograph of an area of approximately one-third of a square mile on the outskirts of a small Pennsylvania city. At the lower right-hand corner of page 17 is shown the same area as it appears on the original contact print. From the enlargement, and by the use of information available from the office of the city, borough, or township engineer, there may be traced a street map of any desired locality adequate for planning, zoning, or tax assessment purposes. Such a traced map is illustrated in cut B, page 18.

On such a map may be recorded most of the facts as to dwelling types, and as to business, industrial or institutional use of land necessary for the preparation of a zoning map and ordinance, and much additional information important to the preparation of community development plans or of a local planning program.

As may be seen in illustration A, this particular area presents a difficult traffic problem due to the turns and bottle necks on its approach along a main highway. Moreover, all east bound traffic is forced to proceed through the congested business section of the town.

How such a condition may be dealt with in a preliminary local plan is illustrated in cut C where a new main highway layout is suggested and there is indicated, in addition, the possible conversion of an unused area along a small stream into a public park and recreation center. In making such preliminary highway plans the air photographs are particularly valuable in revealing obstacles, such as buildings and intensive land uses, and in thus enabling the selection of the most suitable and most economical locations.

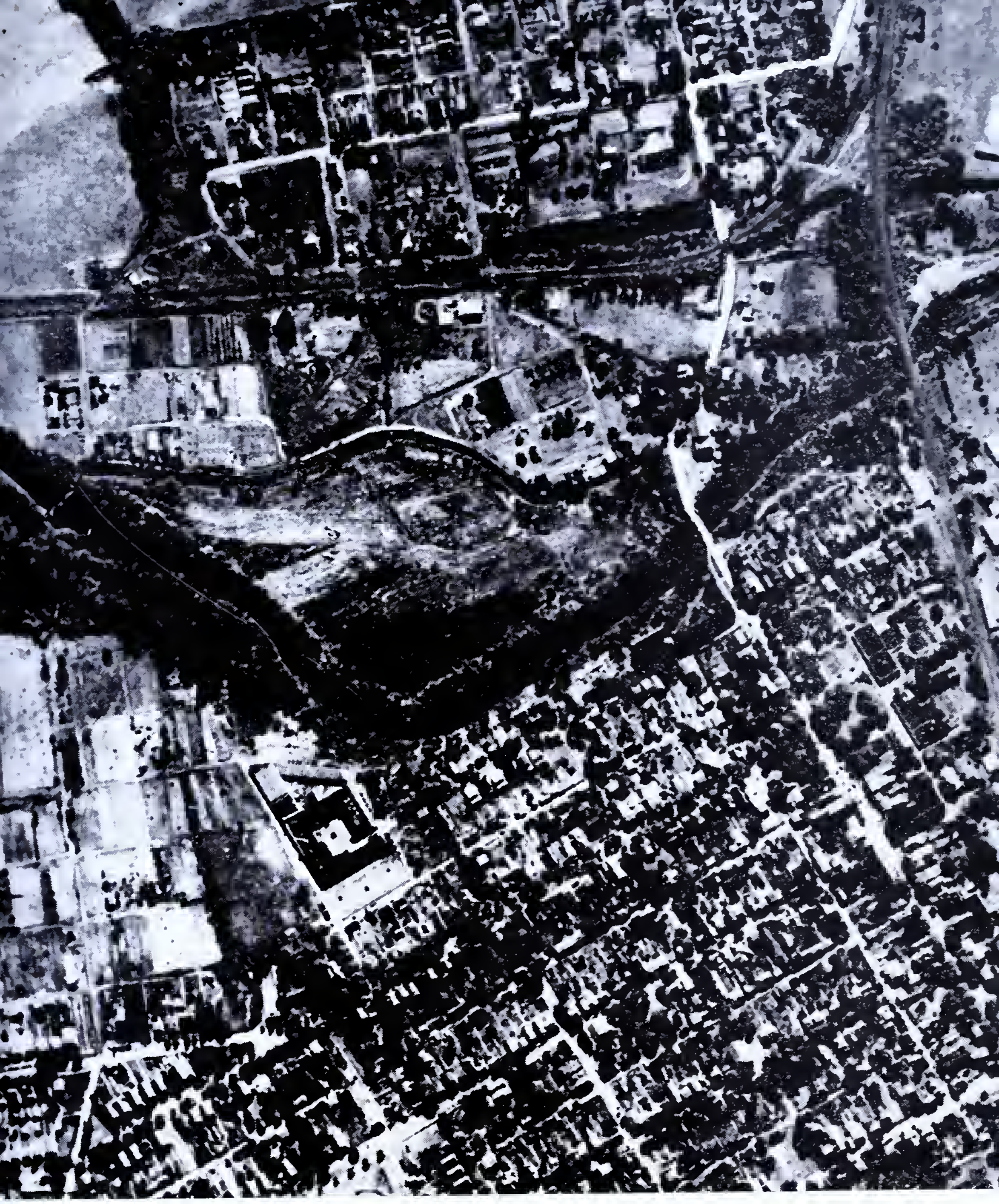
In cut D, page 20, is illustrated the possibility of the discovery of land areas not entered on tax assessment books through the plotting on such air photographs of assessed areas from local tax maps or records. In the absence of tax maps, the use of the air photographs can be extended to the economical preparation of such record maps, by identification of property lines directly on the photographs. This method of making tax maps is particularly applicable to rural and relatively low-value areas. It is largely in the process of making such maps that one discovers the "lost" parcels and "lost" acreages.

Since air photographs are taken at intervals as the plane flies over a landscape the resulting prints when viewed in a stereoscope show an exaggerated relief which sharply reveals all changes of contour. This fact is of great importance in both urban and rural planning and zoning and in determining suitable industrial locations. A simple stereoscope for such use is shown on page 8.

More elaborate stereoscopes have been developed for the tracing of contour lines and the determination of elevations directly from air maps. By their use the preparation of topographic maps has been greatly speeded and simplified.

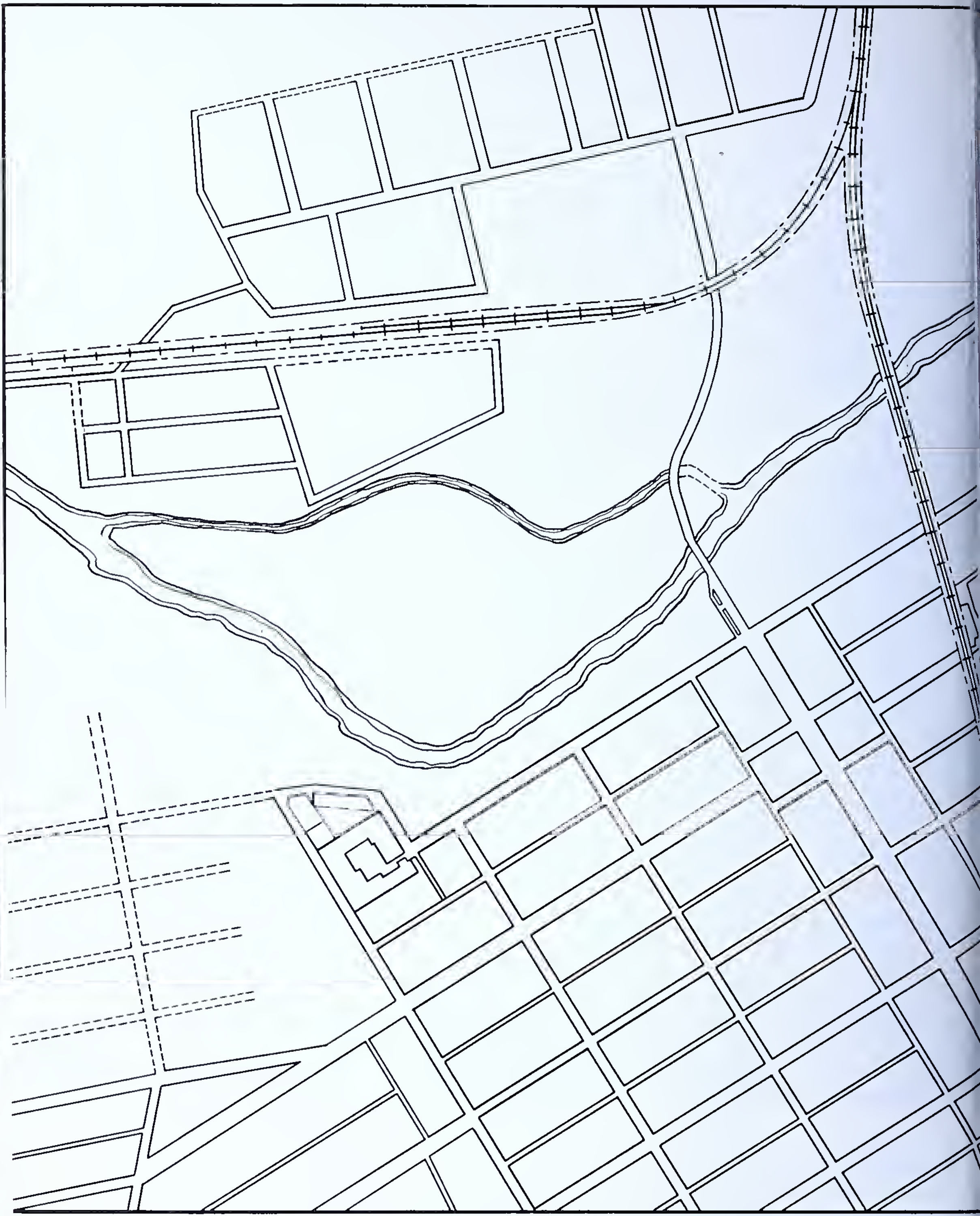
The development of many precision devices by which photographic distortions are rectified and all photographs reduced to an identical scale now makes possible the preparation of very exact tax and planning maps where property values justify the cost.

Further information in regard to the application of air photographs to local planning problems will be found in the concluding article in this issue.



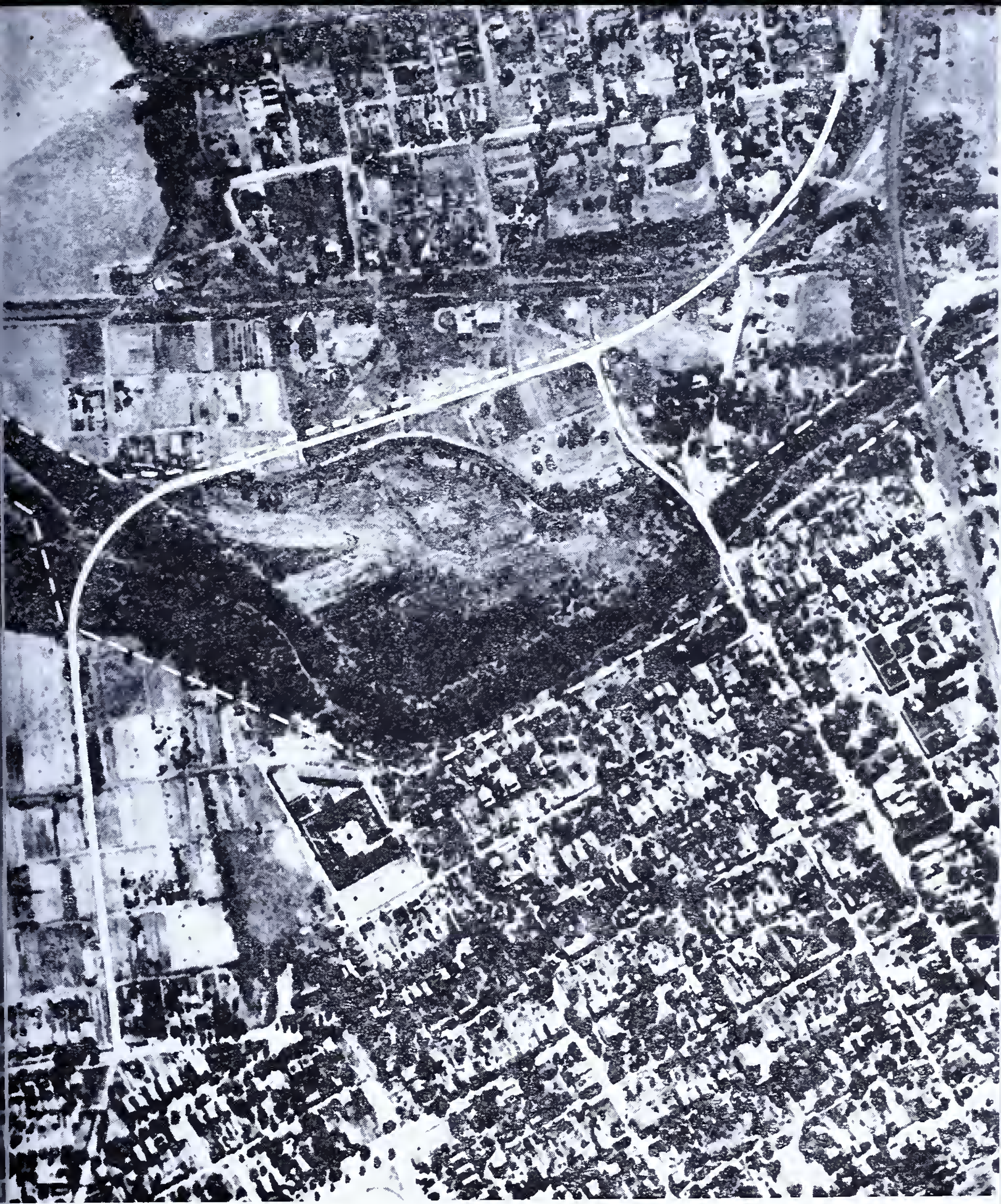
A

Enlargement above, from section of standard contact air photograph (shown at left), yields detail adequate for mapping and planning.

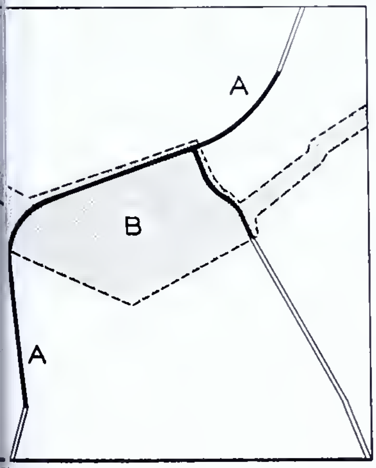


B

Map (traced from enlargement on preceding page) may be used as a base fo
planning and zoning programs

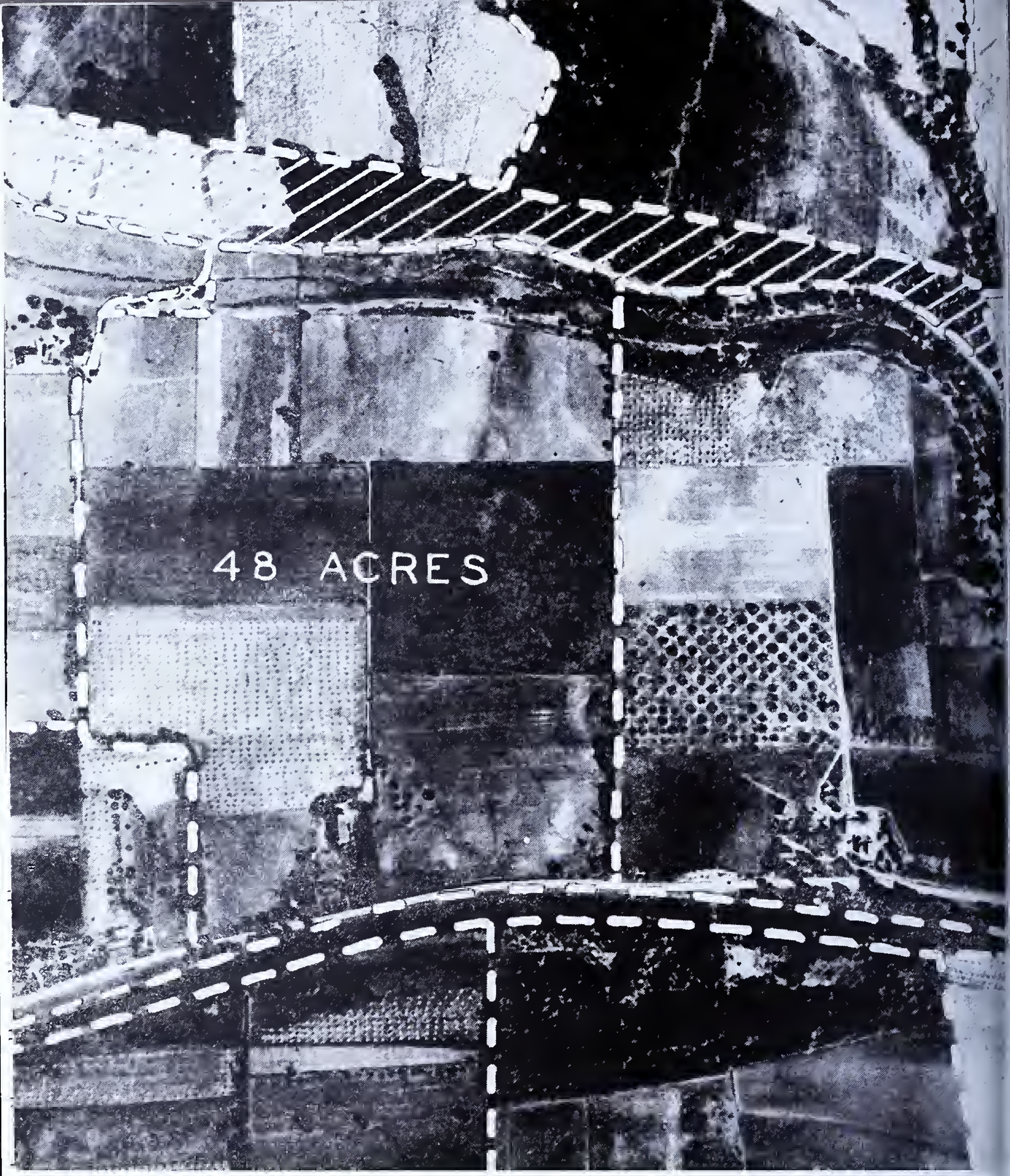


C

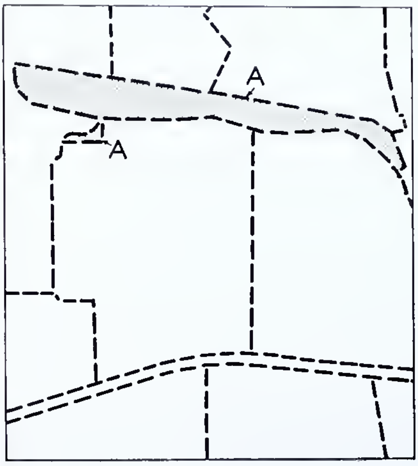


A—Proposed highway realignment to avoid traffic bottleneck is drawn directly on enlargement

B—Suggested park and recreation area



D



A, A—Areas which have escaped taxation are reveal
to the assessor through the drawing of proper
boundaries on this air photograph

Air Maps and Photographs in City, County and Regional Planning

(Written for the Pennsylvania State Planning Board Bulletin on use of Aerial Photographs, by Russell V. N. Black, Consultant.)

Air photographs are among the most valuable of all planning tools. Such photographs are particularly effective when pieced together to form continuous maps or mosaics of the areas under study, but even individual photographs enlarged to an appropriate scale can be used to advantage.

Making a city or county map by field survey is a costly and lengthy process. At scales of from one inch equals 400 feet to one inch equals 1,000 feet, it is entirely practicable to prepare maps sufficiently accurate for most general planning purposes, by direct tracings from good mosaics. (Individual photographs can be used for this purpose but only with greater difficulty and with greater likelihood of error.) The mosaic, when expertly made, can be brought to any reasonable degree of accuracy by reference to known dimensions on the ground. The process is fast and relatively inexpensive, especially in districts for which the initial photographic work has been recently done, as is now the case for most parts of the country.

The air photograph, of course, shows only physically existing objects. In making maps from photographs it will be necessary to go to other maps or records for such data as the widths of street and road rights-of-way, property lines, and the location of mapped but non-existent streets. Whether for use in making a new map or in supplementing existing maps, it will be found necessary or advantageous to have the mosaic photographs at the same scale as that of the map or maps upon which the planning studies are to be made and presented. For convenience it is sometimes desirable to have two or more such mosaics, or sets of photographs, at different scales, corresponding to the scale of other maps in use.

The utility of air photographs in planning ranges beyond making ordinary base maps as described above. They can also be used as a basis for quick small-scale reconnaissance surveys of large areas, or even for the construction of large-scale topographic maps. The latter are made by use of a special stereoscopic machine coupled with ground surveys, and may be sufficiently accurate and detailed for use in making construction and site plans for individual projects like housing developments and sewerage systems.

Making Existing-Use Surveys and Maps

Whether plotting the course of a new highway, determining the boundaries of a new park, or deciding the appropriate nature and extent of a zoning district, a first essential is intimate knowledge of the existing use and character of the land—the location of forests, streams, lakes, and railroads; and the location and distribution of houses, factories, and other buildings. The skilled can read all these and many other useful facts directly from the air photograph. Objects not directly identifiable and the finer definition of land and building types and uses may be covered by systematic checking in the field.

Not the least value of air photographs in planning is in what they show of things in the interiors of blocks and large properties—things not ordinarily shown on maps and not visible from the street or road. Such information, often important to planning decisions, can be obtained otherwise only by tedious and costly mapping or by time-taking trips into the field.

Essential to intelligent zoning is the so-called "existing-use" map, ordinarily made by field survey. Air photographs supply more than nine-tenths of the information needed to make the existing-use map. All that is needed to supplement them is closer identification of special building types and uses like two-family and multiple-family dwellings, the various classes of business and industry, and public and semi-public buildings and lands. Such identifications can be made by taking prints of the photographs or mosaic into the field and making the necessary notations upon them. Finally, the record existing-use map can be made by transferring information from the aerial map to a line map. Or a print of the air map itself may be developed as the existing-use map by use of color and symbols to identify the buildings and uses of special significance in zoning.

Use of Air Photographs in Plan Making

Following its initial services in base-map making and in portraying the location and use of land and buildings, the air map (or photograph) becomes an important frame of reference in projecting plans and improvements. Along with topographic maps and other maps and records, usually available, it supplies a sufficient body of physical information, in the office, for projection of general layout plans without need for numerous trips into the field. Even minor obstacles like trees and, often-times, property lines can be identified in the aerial picture, facilitating the economical and practicable location of objects like new streets and roads.

The air photograph likewise tells a story of land character, useful in selecting sites for things like parks, schools, large-scale housing developments, and airports. For, in the photograph, it is usually possible to distinguish active farm lands from abandoned lands; crop land from pasture; good forest from scrub; and high and well-drained lands from low lands and swamp. Such information enables the planner quickly to narrow down the field of possibilities to such an extent that final site selections can be made with little loss of time.

Naturally the larger the area being planned and the greater the lack of other maps and information the more useful becomes the air photograph and its various by-products. But seldom is there a circumstance in land planning where photographs will not enable the planner to do a better, faster, and more economical job. The utility of air photographs in planning is greatly increased when they are available as mosaics, permitting study of whole large areas without the confusions and interruptions involved in having to work through a batch of oddly-matched individual photographs.

Use of Air Photographs in Plan Presentation

If plans are to be carried out, they must be understood and accepted by people not well accustomed to reading ordinary maps. The location of many kinds of planned projects can be shown directly on air maps or photographs in relation to objects and land marks that can be identified both on the ground and in the picture. Thus, by way of illustration, it is possible, by plotting the location of a new highway on an air map, to show an interested property owner exactly where the proposed road is to go in relation to some familiar object like a tree or a line fence.

Use of Air Photographs as Periodic Record of Change and Trends

The value of periodic censuses of population and of business and industry in appraising conditions and estimating long-range social and economic trends has long been accepted. It seems likely that the same kind of periodic record of changes in the use and character of land would also be of large cumulative value in long-range planning. Such a record could be made available by periodic air mapping.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols., 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.

*Defense Problems, January-March, 1941.

*Post Defense Problems, April-June, 1941.

Index of Publications, August, 1941.

*Community Self-Appraisal, September-October, 1941.

*Self-Appraisal for Increased Production, November, 1941-January, 1942.

*Community Self-Appraisal (Revised Edition), April, 1942.

*Comparative County Data, May, 1942.

*Planning and Zoning Progress in Pennsylvania, July, 1942.

*Population, October, 1942.

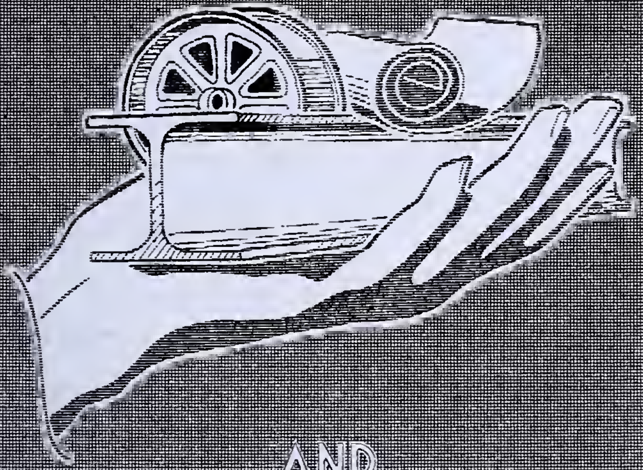
*Handicrafts in Post-War Planning, May, 1943.

*Plastics, July, 1943.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

NSYLVANIA PLANNING

LIGHT METALS



AND STAINLESS STEEL

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

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AUGUST 1944

COMMONWEALTH OF PENNSYLVANIA

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are interested and
to interest others.

Issued by
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STATE PLANNING BOARD
Harrisburg, Pa.

Vol. 9 AUGUST, 1944 No. 4

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NEW MATERIALS FOR MANUFACTURE

¶ A wider choice of materials than was ever possible before will be one of the outstanding features of post-war industry.

¶ Every manufacturer and every producer of raw materials should consider how this fact will affect his product, his methods of manufacture and the competition in his field.

¶ Great opportunities lie ahead of those industries which make full use of the wide range of alloys, and organic compounds developed by modern technology.

¶ The moment this war ends and the demand for military production declines, a large capacity will be released for the production of plastics, alloyed steels and light metals. The application of these materials to old and new types of products will be greatly stimulated by a growing familiarity with their use in airplanes and in all sorts of military and industrial products and processes. The public is today better informed than ever before as to the advantages and properties of industrial materials. The demand for better looking, lighter, more efficient and more durable products is bound to rise and to be supplied. That demand may be intensified by all those factors of higher taxes, and higher production and living costs which are an inevitable consequence of years of war.

¶ Typical of such new materials available for almost every type of manufacture and construction are the plastics,* the stainless steels, the light metals and their numerous alloys.

¶ Pennsylvania manufacturers are likely to meet intensified competition in the production of consumer's goods at the close of the war. Their success in adapting these new industrial raw materials to their products will have an important effect on the State's economy and on the maintenance of post-war employment.

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* See "Plastics," a publication of the State Planning Board, Pennsylvania Department of Commerce.

THE LIGHT METALS

The light metals, the glasses, the plastics, and the alloys of steel and copper are not in any strict sense competitive. Each of these types of material has important and individual properties. Each has its own best uses. If anything can be stated categorically as to our industrial future it is the fact that these best uses will prevail for each of the materials listed above, and that there is a positive disadvantage to their producers and users in applying them to purposes for which they are not best fitted.

The world of the future is not likely to become a hit and miss affair in which sales pressure is a stronger influence than exact knowledge. Applied common sense and applied imagination will dominate our products and our methods of manufacture. It is only the best and most economical use for each type of raw material that will create for it a sure and substantial place in our economy.

The primary but by no means the sole importance of the light metals is their low specific gravity. The weight of aluminum is approximately 35 per cent that of steel and that of magnesium less than 23 per cent. Though strength to volume ratios are comparatively low, weight savings from one-third to one-half or even higher are possible by the use of the alloys of these metals. Their fusion range is lower than that of the ferrous metals and their relative softness makes machining processes generally faster and simpler. They, therefore, are readily adapted to many types of fabrication for which steel or cast iron have in the past been the only available abundant material and, on the other hand, they can replace or supplement wood for many important uses where lightness of weight and beauty of finish is the important consideration.

In many of their properties they are, therefore, midway between wood and steel—and, with the plastics, a parallel development, fill a gap in industrial materials which has existed through all human history. This fact is illustrated by the following table:

SHEAR STRENGTH IN POUNDS PER SQUARE INCH

	Shear Strength	Specific Gravity
Hard Maple (parallel to grain)	1,500	0.67
(Across grain)	6,350	
Cast Phenolic Resins	3,000— 7,000	1.26—1.70
Cellulose Acetate	6,800	1.30
Polystyrene	6,000— 8,000	1.06
Cellulose Nitrate Plastics	4,000— 9,000	1.35—1.57
Laminated Phenolic Sheet	5,000—11,000	1.33
Polyvynyl Butyral Plastics	14,000	1.16
Vinyl Chloride Acetate	13,000—15,000	1.20—1.60
Magnesium Alloys (Wrought or Cast)	16,700—22,000	1.74—1.87
Aluminum Alloys	9,500—42,000	2.56—2.91
Structural Steel	45,000	7.60—7.80
Malleable Iron	48,000	7.33
Cast Carbon Steel	60,000	7.86
Alloy Steel (SAE 3130)	110,000	7.85
Beryllium Copper	56,000—96,000	8.23

Aluminum

More Costly Than Gold

In 1878, when the capstone was set on the Washington Monument, the material selected for the peak of what was then the tallest structure ever erected by man was a metal twenty times more valuable than gold. That capstone of pure aluminum has crowned the Monument for 66 years, exposed to the Washington weather, and is still in good condition. But in the intervening years, from being the rarest obtainable metal, aluminum has become one of the most common domestic materials and, in a hundred uses, is a familiar part of every American's daily life.

This remarkable change was due to a single chemical discovery made simultaneously by a young American college graduate, Charles Martin Hall, and by a French chemist, P. L. T. Heroult, in 1886.

Until that time the production of aluminum was extremely difficult and costly, and the metal was a laboratory product and a museum curiosity

Hall's discovery was, in principle, comparatively simple. The deposit of gold, silver, copper, and other metals from their salts by the use of electrolysis had long been known and commercially used in plating processes, and in obtaining those metals in chemically pure forms.

It seemed probable that, with aluminum so abundant in the earth's crust, it could also be separated by electricity from its close union with oxygen in the alumina clays. To make this possible, however, the salts of the metal would have to be in solution.

Hall's discovery was, in essence, that aluminum oxide could be dissolved at a high temperature in a sodium-aluminum fluoride, cryolite. When an electric current was passed through this solution, metallic aluminum was deposited upon one of the two carbon electrodes in the cell. The problem of commercial production was thus solved, and the first plant ever to put this process in operation was erected in Pittsburgh, Pennsylvania, in 1888. As the Hall process was finally perfected for commercial use the mineral bauxite, a very rich aluminum bearing earth, is first subjected to a hot solution of caustic soda. The soda dissolves the aluminum hydroxide, but not the impurities, which are filtered out. On cooling the solution, aluminum hydroxide settles out in the form of fine crystals. These crystals are heated to drive off the chemically combined water in the form of steam. What is left is a powdery white chemical, aluminum oxide, commonly called alumina. This alumina, dissolved in cryolite, is then put through the electrolitic reduction process, which frees the salt of its oxygen and thus produces metallic aluminum.

While aluminum can be extracted by this process from any of the alumina clays the refining of these clays is costly and difficult and, to this day, bauxite or hydrated aluminum oxide is the normal source of the metal, the principal known deposits in the western hemisphere occurring in Dutch Guiana, and in Arkansas, Alabama, Georgia, Mississippi, Tennessee and Virginia.

As a result of improvements in the process the price of the metal gradually declined. Its use expanded. Its lightness and pleasing color increased its popularity for ornamental objects, and it slowly made its way into industrial production, beginning with cooking utensils, jewelry, and experimental lightweight bicycles produced shortly before the turn of the century.

Ahead of Its Time

These early aluminum products were made chiefly of an unalloyed metal whose purity was not high. They were soft and frequently subject to corrosion. No development in the industrial history of the first 10 years of the twentieth century led to any great demand for lightness of weight in metal products. That period was the height of the great age of iron and steel, whose dominance was as yet unchallenged. The development of heavier and heavier steam locomotives, rails, and rolling stock was a chief feature of mechanical progress. The new light metal had appeared on the industrial horizon a little before its time.

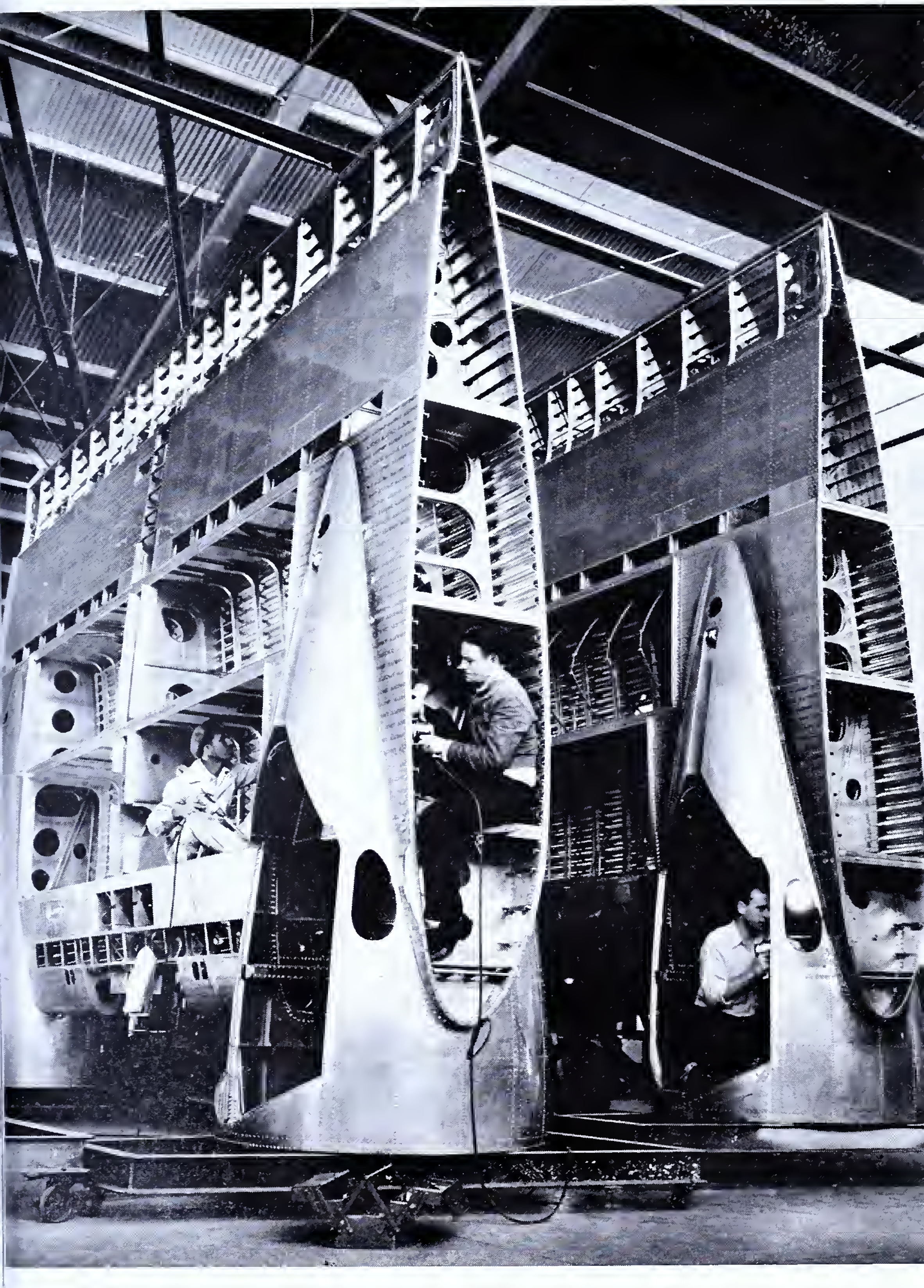
The Time Arrived

But the time arrived. The Wright Brothers with their spruce and canvas biplanes ushered it in. The model T Ford made its coming inevitable. Lightness with strength became the great industrial need of the automotive-airplane age which suddenly rushed upon us at the close of the first World War.

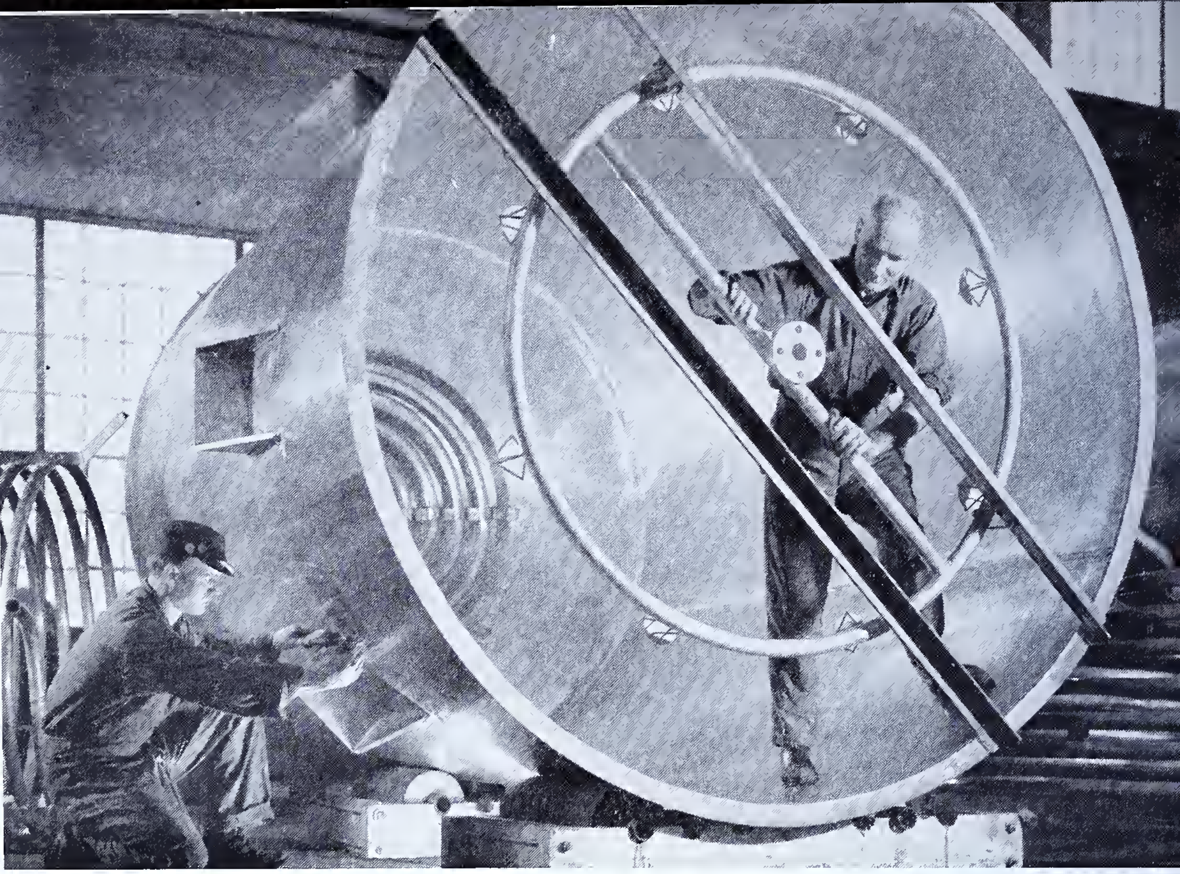
Meanwhile aluminum had also entered its second phase as a commercial metal, for the discovery had been made that if alloyed with other metals new properties of hardness, rigidity and strength could be obtained while maintaining its essential lightness.

The first important aluminum alloy was known as aluminum bronze—a metal almost as hard as steel, brilliantly yellow, and useful in many ornamental and industrial arts.

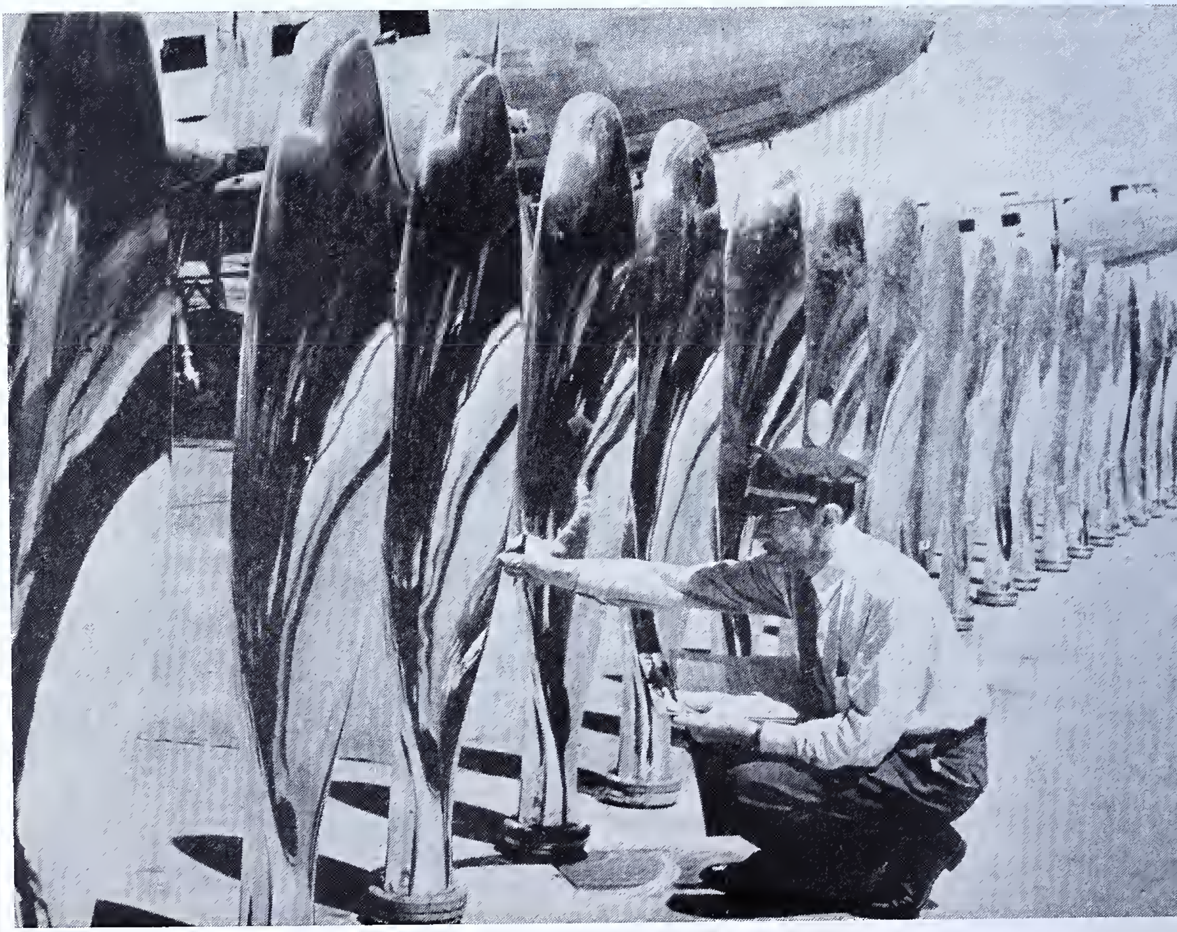
In this alloy the percentage of aluminum was low and that of copper high. The alloy had none of the distinctive characteristics of later aluminum derivatives. It was merely an improved bronze.



This wing section of a non-military airplane shows the extensive use of aluminum forgings, stampings, and extrusions in modern plane construction.



An all-aluminum oil processing tank under construction.



A line-up of aluminum propeller blades.

An alloy in which the aluminum content was 95.5 per cent, with 3 per cent copper, 1 per cent manganese and .5 per cent magnesium was next developed and found immediate use under the trade name Duralumin. The strength and hardness approximated that of soft steel. Its lightness was well below that of any rigid metal ever before available to industry.

During the first World War the frames of dirigibles, the struts and other structural parts of airplanes, and the pistons and cylinder cases of gasoline engines were fabricated from that or from similar alloys of aluminum.

The Aluminum Industry's Expansion, 1914-1943

In the interval between the close of World War I and the outbreak of the present conflict the technology of aluminum has concentrated on four problems:

(1) The development of a large variety of aluminum alloys exploring every useable property of strength, elasticity, hardness, permanence of finish, or ease of fabrication.
(2) The reduction of cost.
(3) The development of methods of fabrication and surface treatment.
(4) The exploration of all possible uses for this new industrial raw material.

As a result of the success with which these lines of research were conducted, the price of the metal fell from 34 cents a pound in 1917, during the first World War, to 15 cents a pound in 1942. Simpler methods of riveting, soldering and welding were worked out. The range of available properties of aluminum alloys was greatly extended and literally hundreds of new uses were discovered.

At the outbreak of World War II, the Nation's production was approximately 350,000,000 pounds. Today, after two years of war, our aluminum production has increased to about 2,100,000,000 pounds a year, or approximately six and one-half times what it was before the war. The years of peace will find available far greater supplies of this light metal than ever before.

Though the factor of power consumption has concentrated the output of the metal to areas where unlimited output of hydro-electric power is available, Pennsylvania has always been the nation's leader in the fabrication of many types of aluminum products and will doubtless continue to hold that leadership in the post-war world.

Aluminum Alloys

The Casting Alloys

Pure aluminum is rarely used as a casting metal because of its softness and low strength. The addition of small percentages of other metals provide characteristics which adapt the resulting alloys to special casting techniques and to various purposes for which castings are required.

Copper

Copper is the most usual hardening component in aluminum casting alloys. Additions of copper up to a limit of 12 per cent result in an increase in strength and hardness. Beyond 8 per cent of copper, however, the resulting alloy is comparatively brittle. (Additions of small percentages of iron, zinc and silicon impart special characteristics to this type of casting alloy.) Aluminum-copper alloys are easily machined and are suited to general purpose die casting, sand casting, or permanent mold casting, but they do not resist corrosion or abrasion as well as aluminum-silicon and aluminum-magnesium alloys.

Silicon

Aluminum-silicon casting alloys are characterized by excellent casting properties and good resistance to corrosion. They are suited to the production of intricate castings, castings combining thick and thin sections, and also to castings for marine work and other purposes where corrosion resistance is an important factor. Alloys of this type are suited for use in architectural parts, cooking utensils, and food handling equipment. Aluminum-copper-silicon alloys exhibit a combination of strength and ductility and are particularly useful for products or parts requiring spinning, bending, or other types of mechanical forming, or for parts requiring pressure tightness. They are, however, not so easily machined as aluminum-copper alloys.

Magnesium

The aluminum-magnesium alloys are particularly distinguished by their higher resistance to corrosion and tarnish. Additions of from 3.8 per cent to 8 per cent of magnesium produce alloys particularly suited to the production of castings for dairy and food handling equipment, fittings for chemical use, and marine hardware. It is more difficult to cast this type of alloy into intricate leak-proof forms and it does not weld so easily as most other aluminum alloys.

Other Alloys

Other combinations of aluminum with such metals as zinc, nickel, and manganese are used for special purposes, such as resistance to softening at high temperatures. The preparation of molds, the melting temperatures, and the fluxing materials of these alloys vary with their chemical. composition, but they all have the common characteristic of being relatively easily finished, and having smooth casting surfaces. These properties offer economies in finishing, grinding, and polishing.

Special alloys of each of the types mentioned above are particularly suited to die casting, sand casting, or permanent mold casting, and certain of the alloys are especially adapted to heat treatment, which effects changes and improvement in their properties.

Certain advantages, particularly those of weight saving, ease of finishing, and high heat conductivity, as well as a moderately high electric conductivity make aluminum castings desirable for various structural, ornamental, and mechanical uses.

The Wrought Alloys

Certain of the alloys of aluminum are particularly adapted to the production of wrought aluminum products ranging from the thinnest foil to 12-inch structural channel bars and seamless tubular masts for ocean-going sailing ships. Among the various wrought products may be included the forgings, the pressings, the extruded shapes, and the screw machine products, as well as sheet, plate, tubing, bars, rods, wire and shapes, all of which are commercially available.

Forgings

Products forged from the aluminum alloys include architectural hardware, chemical apparatus, and machine parts, such as the pistons of internal combustion engines. Special alloys have been developed to meet the requirements of each product.

Drop forging is commonly used in the fabrication of many products, such as airplane propeller blades. Press forging is advisable whenever close dimensional tolerances are desirable before machining.

Extrusions

Certain of the aluminum alloys are particularly adapted to the production of structural and decorative shapes, as well as seamless tubing and other hollow forms, through the process of hydraulic extrusion. In this production process, a hydraulically operated ram acts as a plunger in an enclosed cylinder.

The ingot of aluminum alloy is heated to the proper degree of plasticity and is placed in the cylinder where the ram forces the metal out through the die. This process makes possible the production of shapes having under-cut sections that could not be obtained by any other single metal-working technique. Extruded shapes and seamless tubing are today used exclusively in airplane construction where the process makes possible the high speed production of structural shapes of uniform section and predictable characteristics. Extrusion has also been applied in peace times to such uses as window sash and trim, hand rails, molding, and decorative elements for interior and exterior use.

More recently developed than hydraulic extrusion is a process of impact-extrusion in which a punch strikes with great force an aluminum blank placed in a die. The punch is smaller than the die and under the high pressure of the blow, the metal of the blank flows upward through the space between the die and punch. This operation results in the rapid production of cylindrical forms of uniform section. Variations in the clearances and modification of the shape of punch and die make possible the high speed production, through the impact-extrusion process of ribbed cans, and high pressure containers, as well as shells and cylinders adapted to a great variety of industrial or consumer uses.

In a complementary method of production, known as the Hooker process, the impact method is reversed. A blow forces metal downward through an opening in the bottom of a die. This results in the production of small tubing of plain or decorative contours, useful for such products as mechanical pencils, pens, flashlight cases and brush ferrules.

One further method allied to impact and Hooker extrusion is that of pressing. Powerful presses form, in a single rapid operation, many types of shapes suitable for machine parts and decorative fittings. Pressings have the advantage of accuracy of dimension, good surface appearance and economy of production. Couplings and gears, automotive machine parts and brake pistons, as well as many other types of mechanical equipment, are being produced by the pressing process which, like impact-extrusion, has great future possibilities for economy and speed of output.

Forming

The forming of sheet aluminum into various commercial products is accomplished by the usual processes of blanking, piercing, drawing, stretching, spinning, shape forming, embossing, coining, or stamping. The behavior of aluminum and its alloys under these various processes differs in some respects from that of brass or steel and the steel alloys. The shop practices necessary for such handling of aluminum depend upon the nature of the alloy employed and the characteristics desired in the finished product. The cold working of the aluminum alloys results in strain hardening with an increased tensile and yield strength.

Most aluminum alloys exhibit a considerable range within which the formation of the metal can take place without fracture. It is within this range between yield strength and ultimate, or tensile strength that the metal can be safely worked, and the greater the percentage of elongation in any particular alloy, the greater the ease with which it can be formed. Various aluminum alloys exhibit fairly wide ranges in these properties with a variation in ultimate strength from 13,000 pounds per square inch, in the case of commercially pure aluminum, to as high as 73,000, in the case of certain alloys adapted to heat treatment, and a range in yield strength from 5,000 pounds per square inch in pure aluminum to 57,000 in special alloys of the duralumin type. Certain of the aluminum alloys receive their final strength from cold working only, while others attain additional strength and hardness as a result of heat treatment. It is important that the alloy chosen for a forming process be one which yields the proper strength or hardness and, in addition, provides such other chemical characteristics as may be necessary in the finished product.

Blanking, Piercing and Drawing

Blanking and piercing of aluminum fittings are usually accomplished with the use of annealed tool steel punches and hardened tool steel dies. The shop practices necessary do not differ essentially from those used in the handling of other forms of sheet metal. Deep drawn shapes or shells are normally produced from alloys containing a minimum of other metals, and when the drawing operation is properly conducted with suitable lubricants, the flow of the metal is such that there is little change in the original thickness of the sheet. Since the drawing of brass and steel sheets is often accompanied by a considerable thinning of the metal, it is frequently necessary to redesign tools used for brass or steel, when drawing the aluminum alloys. When severe drawing is necessary, annealing at moderate temperatures is sometimes necessary before the drawing in order to restore the soft temper of the metal.

Spinning

Spinning as a method of forming hollow ware is used when parts are required which cannot be drawn, or where the quantity desired does not justify the cost of more elaborate tools. Cooking utensils, large and small processing vessels, and ornamental ware can all be produced by this method of handling. In the spinning operation a disc of sheet metal is placed in a lathe and forced against a chuck which has the interior form of the desired vessel. By pressure of a hard wood or steel tool against the spinning disc, it is gradually worked down against the chuck until it takes on the desired form. Most spun products are made from commercially pure aluminum or from alloys containing a small percentage of magnesium. Pure aluminum can usually be spun without annealing. The aluminum-magnesium alloys sometimes require intermediate annealing if the shell is deep, or if the spun disc becomes too stiff to flow easily under the spinner's tools.

Shape Forming

Shape forming is an operation intermediate between drawing and embossing. The forming tool shapes a blank without any important change in its thickness, width, or total length. It is a method of forming suitable for high speed operation but in the design of forming tools and dies, allowance must be made for the spring-back of the metal.

Embossing, Coining and Stamping

Embossing, coining and stamping are used for the production of raised figures, or designs in relief, upon the metallic surface, to impress images into plane surfaces, and in general for such compression operations as alter the surface of the material without making any important changes in its thickness. This is useful for decorative purposes, for stamping identifying markings upon metallic objects, for adding strength to an area and for providing collars for welding or riveting.

On the softer aluminum alloys, stamping and embossing operations are relatively easy and can be effected with press tools of simple construction.

Machining

Various aluminum alloys differ somewhat in their adaptability for machine processes. In general, the rake angles of cutting tools should be larger than is common for machining steel. The cutting edges should be kept sharp and free of burrs and the tool surfaces should be bright and free from scratches.

The casting alloys containing copper, magnesium, or zinc, can be machined most rapidly and with the least difficulty. For these alloys, smaller rake angles are permissible and a higher speed of operation possible than with the silicon casting alloys. As the latter type produces rapid wear on carbon or high speed steel tools, they are best machined with carbide tipped tools.

Some of the wrought aluminum alloys are especially adapted to high speed machine work, but even the softest types of the metal may be handled without difficulty when the tools employed are of a high finish and ground to the proper rake angles.

Since aluminum alloys have a high co-efficient of expansion as compared to most common metals, warping and distortion of shape and size may result from over-heating during machining. For this reason, the use of lubricants is frequently necessary and when over-heating does occur the work should be allowed to cool before being finished to size, in order to attain the necessary final dimensions.

Riveting

The joining of aluminum parts to form larger structural units, and the attachment of aluminum to other metals presented problems which have fortunately been solved by the development of riveting techniques and improved methods of welding and brazing. One prime difficulty in the joining of aluminum to other metals with steel rivets is the vigorous electrolytic action which takes place between aluminum and most of the other common metals in the presence of moisture, salt water, or the air of industrial cities. The riveting of aluminum to other metals or the use of steel rivets is, therefore, inadvisable unless the joint is adequately protected by paint to prevent corrosion. Several types of aluminum alloy rivets, however, provide adequate driving strength and are now in common use. In general, aluminum alloy rivets are driven cold if less than one-half inch thick. Rivets larger than one-half inch thick are usually driven hot. One type of aluminum rivet requires a primary heat treatment followed by quenching in cold water. After treatment, these rivets are stored in refrigerators at a temperature of thirty-two degrees Fahrenheit. This arrests age hardening which takes place at room temperature, the rivets after being driven attaining final strength in about four days. This peculiar property of the age hardening of certain of the aluminum alloys is also useful in many of the forming processes.

Welding

Aluminum welding has become a matter of great importance because of its application to various airplane parts. Within the limits of this booklet, however, there is no space to deal with the details of the various welding techniques which have been developed within the past few years.

Commercially pure aluminum and aluminum-manganese alloys are the most readily weldable of all the aluminum derivatives. In general, by using the proper technique most of the various aluminum alloys can be welded with as little difficulty as other common industrial metals.

Fusion welding is applied particularly to alloys used in the manufacture of furniture or for elements requiring high structural strength. The aluminum copper alloys, which are best handled by resistance welding, are also applicable to structural elements.

The welding of castings is usually accomplished by the use of gas flame or by the electric arc, and provides a convenient method of repairing cracked or broken castings or eliminating minor faults.

Spot and strip welding have been successfully applied to a large number of industrial operations, particularly in the formation of airplane parts such as fuel tanks, or the skin sheets of wing sections.

Brazing

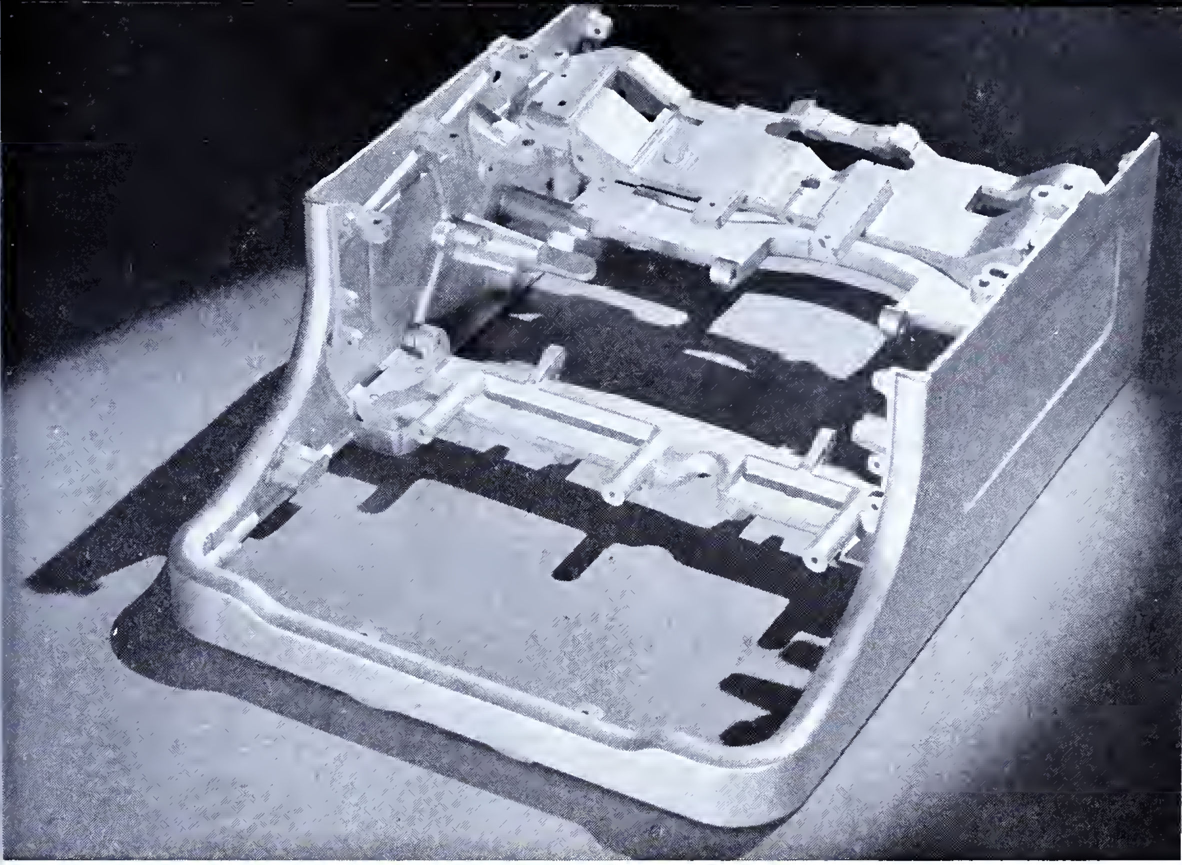
Brazing differs from welding in the fact that the filler material has a lower melting point than that of the metal to be joined. Brazed joints are less costly to produce and usually neater in appearance than welded joints, but do not generally have the same high tensile strength. Three brazing methods have been adapted for use with aluminum alloys.

Torch brazing is usually applicable to smaller assemblies. In this process the filler material at the joint is heated locally with a welding torch using a reducing flame. Furnace brazing is accomplished by applying a flux, assembling the parts to be joined, and raising the temperature of the assembly in the furnace to a point which causes the filler material to flow in the joint without melting the elements which are being joined.

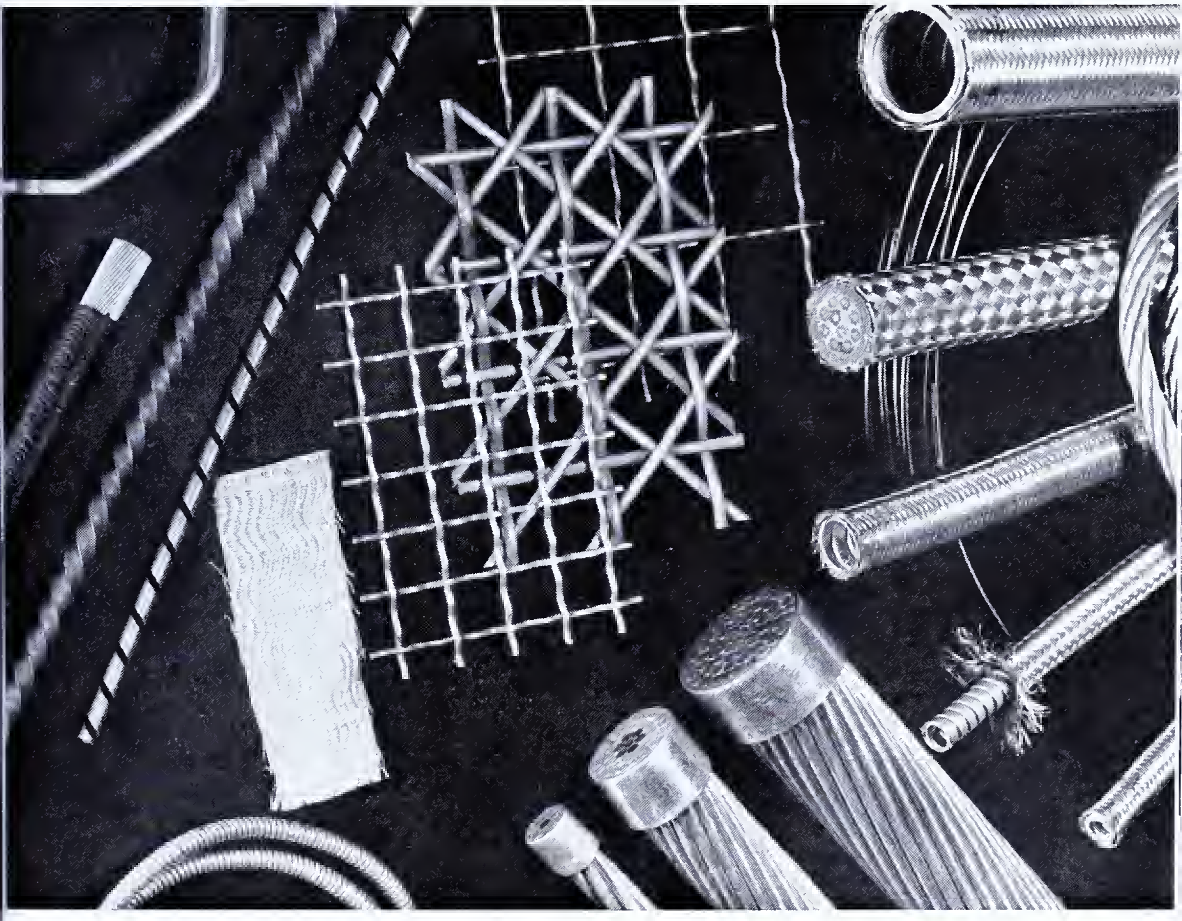
Dip brazing of aluminum is a comparatively new process, not applicable as yet to all of the aluminum alloys, but it is likely that the progress now going on in the various techniques for joining aluminum parts at lower temperatures will have an important influence on the use of the metal in the post-war years.

Finishing

The finishing and surface protection of the various aluminum alloys permits the production of a variety of surfaces suited to decorative as well as industrial uses and adapted to many requirements as to surface hardness, color, or resistance to corrosion. The grinding, polishing, and buffing operations do not differ markedly from those employed on other industrial materials. For decorative uses buffing, burnishing, and planishing provide a variety of beautiful finishes while a mat surface is obtained by the use of the scratch brush or by sand blasting.



This typewriter frame is an aluminum die casting.



Aluminum wire and cable products.

Aluminum furniture and ornaments.

A dining car with aluminum furniture, decorations, and fittings.

Various chemical finishes producing decorative surfaces resistant to corrosion are applicable to lighting fixtures or other household utensils and may be applied with a minimum of equipment.

Perhaps the most important type of surface protection for the aluminum alloys is that attained by the electrolytic deposit of oxygen upon the metallic surface. Since aluminum oxide in the form of corundum is one of the hardest of minerals, the surface attained by this process is highly resistant to abrasion. The result of the process is similar to that attained by the case hardening of steel. Aluminum products after being subjected to this treatment are useful for hand rails, automobile pistons, and other applications where a high degree of surface hardness is important. In addition to surface hardness the oxide finishes of aluminum, as applied by electrolytic action, add considerably to the surface resistance to corrosion from atmospheric moisture or salt water.

Such finishes may also be dyed or painted for decorative uses.

The electroplating of aluminum with chromium, nickel, copper, brass, and silver provide brilliant metallic surfaces—a primary deposit of nickel being generally advisable to secure permanent adhesion of the metallic film to the underlying alloy.

Aluminum products subject to exposure to moisture or salt water, particularly welded products, and those in which aluminum is intimately joined to other metals, usually require a protective covering of paint or enamel. In such cases aluminum paint or certain of the new plastic resins provide the most satisfactory protective covering.

Applications of Aluminum

While it is impossible to foresee all the directions in which the aluminum alloys will be employed in the post-war period many of the war time developments and those which have occurred since the period of the first World War clearly indicate that this metal will be an important element in our future industrial pattern. Its outstanding characteristics of lightness of weight, high index of heat and electrical conductivity, its high reflectivity of light and radiant heat, as well as its chemical stability and the ease with which it can be cast, wrought, machined, and extruded seem to make this inevitable. The metal's attractive appearance, and the very greatly increased capacity for its production are also likely to prove factors in increasing its general use.

Transportation Equipment

The low specific gravity of aluminum, together with a favorable weight-strength ratio, have made it probable that wherever the elimination of dead weight is an important item of design the metal would be able to compete with the alloyed steels at least on even terms.

It is no part of the purpose of this booklet to advocate to the manufacturers of the Commonwealth the use of any one raw material in preference to all others. Pennsylvania's interest in the steel industry is profound. The development of alloyed steels of remarkable properties has proceeded side by side with the development of the aluminum alloys. For each of these structural materials there are optimum uses under various conditions of operation for any type of transportation machinery.

In rail transportation and rail equipment, though there is an unquestionable tendency to reduce dead weight, it is probable that the steels and particularly the alloy steels will rather more than hold their own in competition with any other industrial metals, though it is not unlikely that competition of aluminum and stainless steel will appear in the high-speed streamlined railroad trains of the future. Tank cars and gondolas built largely of aluminum alloys are already employed for special uses. For ordinary hauling purposes where special equipment is not required it is unlikely, however, that the light metals will replace iron and steel and the ferrous alloys.

As one considers all the various means of transportation beginning with the railroad freight train and ending with the fastest fighter plane—a series in which the elimination of dead weight becomes of steadily increasing importance it is obvious that the field of aluminum stands at a midway point—first overlapping that of the alloy steels in streamline train construction and in the construction of lightweight trolley cars, and finally, at the upper end of the transportation series, meeting the competition of the magnesium alloys where extreme lightness is necessary in the construction of the fastest airplanes.

In a general way, it is in this middle field in the transportation picture that aluminum may be expected to find extensive application in the future. In the construction of trucks and automobiles it is very likely that the competition between aluminum and the alloyed steels will become particularly keen. Much will depend upon the type of car which becomes popular in the ten years succeeding the second World War. If the factor of gas consumption becomes of first importance, due to advancing prices for oil or the burden of heavy taxes, it is probable that the light weight of the aluminum car body and frame may lead to its general acceptance, despite the greater first cost of such equipment. If, on the other hand, increase in speed of traffic, and the maintenance of the car type popular in 1940 is the direction the industry follows, it appears likely that the stainless steels and other steel alloys will still be largely used in car construction. Further lightening of the dead weight of trucks, to permit the carrying of heavier pay loads without increased expenditure of fuel, seems to be an inevitable feature of future automotive design, and it is to be expected that the competition between aluminum and steel alloys will be particularly keen in the development of structures of favorable weight-strength ratios for the truck chassis and body.

While the probabilities somewhat favor the increased use of alloyed steels on automobile construction, they appear markedly to favor the aluminum alloys in the construction of transport planes, and wherever lightness with strength becomes a critical factor, and first cost is relatively unimportant.

Indicative of most developments in the transportation field are the construction of an all aluminum nine-car train for a western railroad, the development of aluminum tank cars for the transportation of chemicals, and of aluminum gondola cars for the hauling of raw sulphur. Aluminum alloy side rods have been installed in locomotives, effectively diminishing the inertia of reciprocating parts, and aluminum cabs have been constructed for a number of locomotives, in an effort to lower total operating weight.

While it is impossible to foresee the final results of the interplay of the various factors of speed, tensile strength, economy, safety of operation, and first cost in the transportation field, there is no doubt whatever of the fact that the increased competition between aluminum and the alloy steels will result in increased efficiency of performance, and in more exact adaptation of parts and materials than was ever known in the transportation field before.

Ship Building

The lightening of the superstructure of steel vessels through the use of aluminum fittings, bulkheads, companions, stanchions, masts, and other structural elements offers extremely interesting possibilities which may well find their first application in yachts and other smaller craft where the increased first cost of such construction is not prohibitive. It is probable that certain difficulties growing out of electrolytic reactions of aluminum with iron or steel in the presence of salt water will have to be solved and the cost-performance ratio proved favorable by extensive demonstration before we shall see the general construction of large marine units with all-aluminum superstructures. Smaller boats, such as life boats, have been successfully built of aluminum and are particularly valuable in reducing the weight of the weather deck load on passenger liners.

Architectural Use

It is not likely that aluminum will ever replace steel as the major skeletal material for large structures. There appears to be no good reason why it ever should. For decorative use, however, and in lighter structural elements, such as window sashes and frames, it has proved attractive and efficient as well as non-corrosive and weather resistant, providing again a field in which competition with the steel alloys will doubtless result in many technical advances for both of the competing materials. Cast ornaments of aluminum are as yet a rarity but promise to provide an important addition to present materials for home decoration and architectural trim. The possibility of the production of extruded shapes for molding and trim has as yet not found its full use in domestic or commercial architecture, and is another field open for extensive future development. The interior fittings of many of our modern trains and through busses are hints of decorative possibilities through the use of aluminum alloys in interior fittings. Larger shapes are adaptable for use as exterior ornaments on office buildings and store fronts, and have already been extensively applied to these purposes.

Domestic and Industrial Utensils

The use of aluminum cooking utensils and vacuum cleaners is familiar to all housewives. The accumulated post-war demand for such equipment will doubtless be large and the greatly increased capacity for aluminum production will encourage the application of this metal to many types of domestic equipment for which it has not been extensively used in the past, particularly in combination with both plastics and alloy steels. The same characteristics which made aluminum desirable for cooking utensils, its lightness, its high thermal conductivity and its resistance to attack by many of the organic and inorganic salts have provided a field for the metal in the production of many types of chemical apparatus. Since the metal resists the attack of certain acids and alkalies, is mildly corroded by others, and is rather vigorously attacked by a few the application of the metal to chemical apparatus is a matter of specific study in which the concentration of the chemical and the type of alloy to be employed are important factors.

Aluminum vessels have been successfully used in contact with solutions of sulphuric and nitric acids under special conditions, and many of the organic acids are commercially prepared in aluminum equipment. In some cases aluminum develops a protective coating after exposure to corrosive chemicals which prevents further attack. The alcohols and glycerines are frequently processed in aluminum apparatus, as are also benzene, kerosene, and most other ethers and hydrocarbons. Aluminum drums are approved by the Interstate Commerce Commission as containers for shipping solid phenol. Drums or barrels formed from aluminum are in extensive commercial use for handling many types of chemical or food products. The coating of aluminum with various types of plastics which are acid or alkali resisting provides lightweight containers for many industrial uses.

Furniture and Office Equipment

In the field of domestic furniture and equipment the combined use of aluminum and the plastics provides an immense variety of combinations of strength, lightness, and color. Such combinations in the creation of furniture, household appliances, and industrial machinery, as well as in the decorative treatment of every type of automotive equipment, offer very large possibilities to the manufacturers of this Commonwealth in the post-war years. Of both the plastics and aluminum there will be a very abundant supply. What applied imagination may do with the innumerable combinations of these two materials will determine the successful development of many new consumer industries and, let us hope, the maintenance of our older industries through the adaptation to their products of these two abundant and interesting industrial materials.

Textile Machinery

In the textile field aluminum machinery has made great advances within the past twenty years and promises extensive future developments. Most textile machinery is necessarily of the reciprocating type where the elimination of dead weight and inertia results in considerable economies. The metal is also unusually resistant to chemical attack by reagents employed in the preparation of textiles and is free from staining effects. It therefore presents particular advantages for use in this field in which Pennsylvania is greatly concerned as the Nation's largest user and producer of textile equipment.

Electrical Equipment

Aluminum's comparatively high electric conductivity together with its light weight have led to a considerable use of aluminum wire and bus bars in central station equipment and to the design of stranded aluminum cable with a steel core for high voltage transmission. On an equal weight basis aluminum is a better conductor of electricity than copper. This fact permits the construction of stranded cables in which the tensile strength of steel allows wide spans between poles. Here again, however, limiting factors indicate that there is no likelihood of aluminum replacing copper in general use for electric installations except where the factor of weight or appearance are important.

Packaging

In the form of tubes, foil, bottle tops and caps and jar tops, aluminum had made extensive progress in the pre-war years and is likely to provide one of the most widely used metallic package materials after the war is over. Combinations of aluminum foil and plastic closures are particularly efficient in preserving the qualities of many food and tobacco products.

Insulation

The high thermal reflectivity of aluminum foil has of recent years led to its extensive use as an insulator against heat transference through the walls and roofs of houses. Aluminum foil properly attached to the studding during construction provides one cheap and effective way of preventing a considerable heat loss in dwellings during the winter months and lowers the interior summer temperature.

In the Fine Arts

The many attractive types of surface finishes possible with aluminum and the unique silver-gray tone of the metal's normal coloring promise important future usefulness in the arts. Its properties as a casting metal have long been made use of by sculptors and the steadily declining price of the aluminum alloys will make possible in the future a more extensive use of the metal in the statuary arts. One important field may well be its application to ornamental doors where its light weight becomes of peculiar value.

The facility with which many of the aluminum alloys may be spun, hammered, wrought and engraved provides the craftsman with an opportunity of applying the techniques of the pewterer and the silversmith to the fabrication of hand wrought vessels which combine both beauty and utility.

MAGNESIUM

Were it not for the fact that small additions of other metals greatly modify the characteristics of certain of our metallic elements the use of magnesium in industry might be extremely limited. As it is, however, this metal, whose weight is only two-thirds that of aluminum and less than one-fourth that of iron, has found widespread application in the industries of a world where extreme lightness of weight has become a vital element in national defense and in the development of air transportation and military power.

Though magnesium is by no means so widely distributed in the rocks of the earth as aluminum or iron, and occurs chiefly in magnesite and brucite or, combined with calcium, in dolomitic limestone, the production of this metal has shown in recent years a phenomenal increase. From an annual production of 116,000 pounds in 1917, the output of magnesium rose to over 6,700,000 pounds in 1939. By 1941 due largely to the demand from the aviation industry the output had increased to approximately 32,600,000 pounds. So great has been the increase in productive capacity during the past two years that in the single months of August, 1943, there was recorded a production of approximately 36,000,000 pounds of magnesium which was six times the annual production for the year 1939. The annual output is today approximately 500,000,000 pounds. A large part of this increase is due to the utilization of the very high magnesium content of the brines in certain Michigan salt wells. In the development of processes for the extraction of metallic magnesium from these brines it was soon perceived that it would also be possible to extract magnesium from sea water whenever the necessity arose, despite the fact that sea water contains only .13 per cent of magnesium chloride. War-time requirements for ever increasing quantities of this lightest of all structural metals have supplied the spur of necessity and a considerable part of our present American output of metallic magnesium is now being extracted from sea water. Since the sources of magnesium are more varied than those of aluminum, there is today no single standard process for the extraction of the metal from its brines or ores. While most of the present output is a result of electrolytic action other extractive methods make use of heat, in processes similar to distillation.

Greatly increased capacity, which has resulted from the demands of war, makes it certain that in the post-war years a far larger quantity of magnesium will be available for industrial use than was ever before deemed possible. Paralleling this increase of output, the cost per ingot pound has dropped from $5.00 in 1916 to $.25 in 1943, as compared with $.15 for aluminum and $.12 for copper

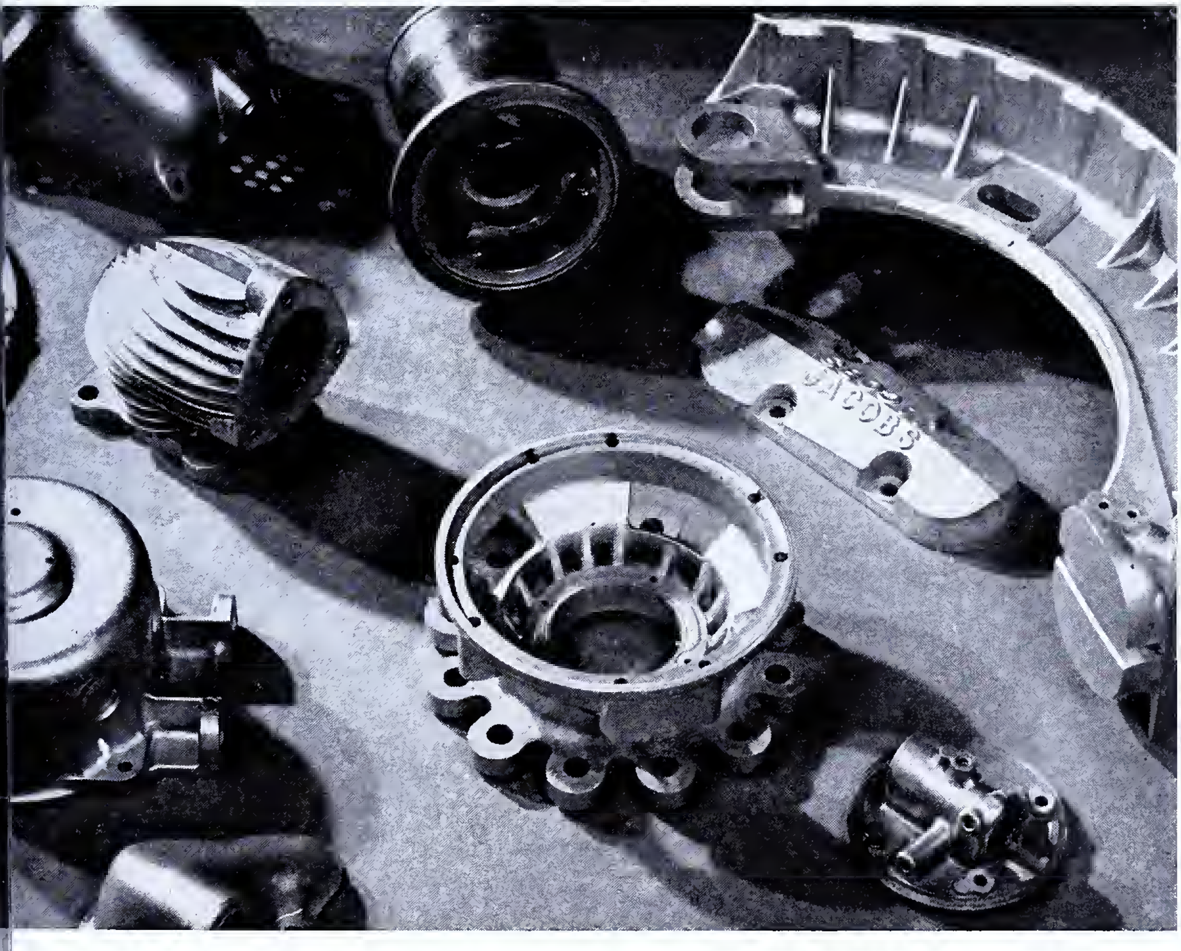
A few years ago the only acquaintance which the general public had with metallic magnesium was in the form of photographic flashlight powder, or as a combustible, brightly burning ingredient in rocket heads or flares, such as those shot up by Verey guns to illuminate "No Man's Land" during the trench warfare of World War I. Today, this metal, with its numerous alloys, has become an important industrial material for light-

Aluminum provides a beautiful medium for the metal working crafts.

Light-weight magnesium extrusions are used in this twisting machine in a Pennsylvania textile factory.

Magnesium warp beams combine lightness and strength.

Typical magnesium sand castings.



Magnesium die castings have many industrial uses.

The light weight of magnesium casings adapts them to many products. This tiny motor with magnesium crank case, crank case cover and control lever weighs only two ounces but develops ⅛ of a horsepower.

weight construction and for many other specialized uses and must be seriously reckoned with in the design of products for post-war civilian and industrial use.

In general the magnesium alloys are related to the alloys of aluminum in certain physical and chemical properties but are markedly different in many other characteristics. The following brief summary will serve as an introduction to the special qualities of the magnesium alloys with emphasis rather on the differences than upon the similarities of these alloys to those of aluminum.

The Magnesium Alloys

As already indicated magnesium is a metal of more limited and special utility than aluminum.

A metal weighing between .063 and .066 pounds per cubic inch is notably lighter than any other available metal including aluminum, which weighs one-half more. This characteristic is naturally of particular advantage in aircraft design where the saving in the dead weight of structural elements is of first importance. It is also useful in machine parts subject to rapid reciprocating motion, such as certain moving parts in textile machinery, and in all cases where the compactness possible in either cast or wrought metallic shapes must be combined with extreme lightness. Certain types or parts of office machinery fall into this class of applications.

Portable apparatus of various types such as chain saws to be carried about for felling and sawing timber, spray guns for use in painting operations, pattern plates and flasks used as containers for sand molds in iron foundries, portable roller conveyors, have recently been listed by the War Production Board as important civilian uses for which surplus magnesium may be allocated. It is also now available for the construction of artificial legs and arms. Such products are typical of future industrial applications in which the light weight of this metal will be important. It is obvious that step ladders and various forms of furniture, as well as housings for many domestic utensils such as vacuum cleaners may be advantageously constructed from this metal.

On the other hand where lightness of weight must be combined with surface hardness, or resistance to corrosion, as in the wing surfaces of airplanes, aluminum is more generally useful, and in those cases where hardness of surface is of vital importance the stainless steels take over as the preferred industrial material.

Strength

The strength of a metallic alloy is not a simple property, nor can it be separated from considerations of over-all mass, or from requirements which limit the dimensions of a structural member or of an appliance for consumer use. As compared to alloys of aluminum many of the magnesium alloys are relatively high in tensile strength. In yield strength in compression the cast alloys of magnesium are comparatively low. The relative endurance limit of sand cast magnesium on bending tests is favorable as compared to aluminum on a basis of pounds per square inch and on an equal weight basis it is considerably higher, and higher also than that of malleable iron or carbon steel, while with certain wrought magnesium alloys the relative endurance is approximately twice that of structural steel and approaches that of many of the alloy steels.

In shear strength, stiffness, and hardness magnesium is low, but in damping capacity and resilience it ranks high.

The magnesium alloys have a lower modulus of elasticity, measured in pounds per square inch, than most, if not all, of the aluminum alloys and a very much lower modulus than any of the ferrous alloys, or than hard brass. Rigidity is also low. Wherever the metallic part is subject to heavy shock loads magnesium is relatively undesirable.

One consequence of the low modulus of elasticity of the magnesium alloys appears in forming operations where at room temperatures a considerable spring-back occurs which necessitates specially designed dies to produce a formed object of required dimension. As a consequence of this characteristic it is desirable, and in some cases necessary, to form magnesium vessels and shapes at temperatures between 450 degrees and 700 degrees Fahrenheit, at which temperatures the metal is easily formed and spring-back is practically eliminated.

In general the forming properties of magnesium are less favorable than those of aluminum because of differences in the crystaline structure of the metals, and this fact must be considered in all bending and forming operations undertaken on the magnesium alloys.

Thermal and Electrical Properties

In thermal properties aluminum and magnesium are quite similar, though magnesium is a somewhat poorer conductor of heat than aluminum, by unit volume. One important difference between the two metals lies in the fact that at about 1200 degrees Fahrenheit in the case of the pure metal, and at a lower temperature in the case of most of its alloys magnesium, if heated in the air, will ignite and burn with an intense white light, while aluminum, under similar conditions, melts and cannot be ignited except when in a finely divided form. This difference in behavior is due in part to the low boiling point of magnesium which releases an inflammable vapor, and to the fact, which is also important in regard to surface protection, that magnesium oxide is porous while the oxide of aluminum forms a tough film which protects that metal from rapid oxidation.

While finely divided or foil magnesium is inflammable, the fairly high conductivity of the metal eliminates the danger of combustion under normal conditions, since heat is rapidly conducted away from a flame such as that of a blow torch and the metal's temperature does not ordinarily rise to the burning point. For this reason magnesium alloy sheets of 2/100 of an inch thickness may be fusion welded without ignition.

The electrical conductivity of magnesium is 38 per cent that of annealed copper and approximately 61 per cent that of commercial aluminum, on a basis of equal volume. On a basis of equal weight the conductivity of magnesium is 197 per cent that of copper while that of aluminum is 212 per cent. In electric spot welding the lower volume conductivity of magnesium alloys, is an advantage since the greater resistance of the metal makes possible the spot welding of larger parts and heavier sections with an equal power output.

Chemical Reactions

Sea water and carbonated water in general attack magnesium much more violently than they do aluminum. Concentrations of 80 per cent or higher of synthetic nitric acid are successfully stored and shipped in aluminum containers while this acid rapidly attacks a vessel of magnesium. On the other hand hydrofluoric acid, which attacks glass and almost all of the metals in concentrations of from ten to fifty per cent, has little effect upon a magnesium container but attacks aluminum quite violently. Chromic acid in concentrations greater than 10 per cent reacts rapidly with an aluminum container though magnesium is not noticeably corroded. The caustic alkalies also attack aluminum and its alloys but react only feebly with magnesium.

These examples will indicate that in any particular problem where the use of light metal vessels is required for chemical operations, or for shipping a particular chemical product, the specific behavior and reaction of the chemicals upon these metals must be ascertained. Aluminum tank cars and gondola cars are now in commercial use for chemical transportation. Because of the problem of surface protection against abrasion and atmospheric corrosion magnesium is not likely ever to rival its elder brother in this field.

Advantage has been taken of the chemical properties of magnesium in the construction of oil well casings for the specific purpose of temporary blocking off the flow of wells. Such casings when no longer needed can be destroyed by acids permitting the resumption of flow, and the War Production Board has recently authorized the release of magnesium for this purpose.

A Comparison of Properties of Aluminum and Magnesium

It is quite obvious that many of the properties of aluminum such as its ability to form a self-protecting surface oxide, as well as the hardness which can be imparted to its surface by the anodic deposition of oxygen, make that metal one of greater general utility for all such purposes as architectural and decorative details, structural members, and household utensils. The comparative ease with which aluminum may be formed in the cold state makes its application to such consumer uses as cooking appliances more economical, safer, and more effective than would be true for magnesium. The use of thin sheets or foil of aluminum as a protective coating in packaging or as a reflecting insulator against heat loss in building construction is already widespread. For such purposes magnesium is not desirable, any thin or foil form of that metal constituting a definite fire hazard.

It is therefore clear that in most industrial uses aluminum is likely to remain a preferred metal not only because of its advantage in cost but also because of its superior strength and more versatile properties. On the other hand magnesium offers superior advantages wherever extreme lightness of weight is a vital element of design. In addition to this quality there are certain other advantages, such as easy machinability, which sometimes lead to economies of fabrication and make its use preferable to that of any other metallic substance. Magnesium castings are produced with somewhat greater difficulty than those of aluminum but exhibit exceptional fineness of grain which makes them desirable for many special uses. The low modulus of elasticity of magnesium is important in machine and structural parts where sound-damping effects are called for. Where greater impact resistance is necessary aluminum is applicable to similar uses, but does not provide the extreme damping properties of magnesium. Both metals have been used with success as deoxydizing agents in steel manufacture. Both are important in airplane design and while their fields of usefulness overlap, it is obvious that in the compromise between lightness of weight, structural rigidity and surface hardness—magnesium and its alloys are at one end of the scale of properties, with steel and its alloys and the beryllium coppers at the other, while the aluminum alloys occupy a middle place presenting characteristics of both of the two extremes.

METHODS OF FABRICATION AND HANDLING

Casting

Magnesium alloys, available for casting, combine lightness with high strength and easy machinability. They are particularly useful for rotating and reciprocating parts where light weight insures economy of operation and for housing and similar uses where weight is also a critical factor.

Sand castings of intricate design are possible by the use of special techniques and are free from porosity and are of uniform quality. Where close dimensional tolerances are necessary, permanent mold castings may be made which, as a rule, require less subsequent machining. By die casting, close dimensional accuracy and a smoother finish may be obtained, resulting in low cost production due to the ease with which final machining may be carried out wherever maximum lightness and thinness is desired in the finished product. Because die casting does not permit of feeding during solidification, uniformity of interior structure in complicated forms is, more difficult to attain by this process than by either sand or permanent mold casting.

As in the case of aluminum, the design of casting molds and dies must generally be modified from those used for the ferrous metals. For equal performance, thicker sections are usually necessary as well as the elimination of sharp cut-ins. Since both aluminum and magnesium have higher co-efficients of expansion than the ferrous alloys and most other metals, allowances must be made, in the design of patterns, for this larger shrinkage in cooling which in the case of the magnesium alloys amounts to 11/64 of an inch per foot.

Wrought Magnesium Products

Wrought magnesium is available in sheets which may be most readily formed, drawn, or stamped at a temperature of from 500 to 700 degrees F. In general the alloys of magnesium are more brittle than those of aluminum although there are limited possibilities of bending and drawing in the cold condition with certain of the alloys at a soft temper. For certain structural purposes, on a weight to weight basis, magnesium sheet is particularly desirable since it is more than twice as stiff as an aluminum sheet of the same weight and eighteen times as stiff as a steel sheet of the same weight. For use at temperatures higher than 400 degrees Fahrenheit, however, either steel or aluminum is preferable to magnesium which loses structural rigidity rapidly at elevated temperatures.

Extruded Shapes

The extrusions of magnesium, like those of aluminum, are readily supplied in shapes of complicated cross section not easily obtainable by any other mechanical process. Where lightness of weight and moderate structural strength is called for by design, no other metallic substance can provide the variety or efficiency of magnesium extrusions. This fact has proved particularly useful in aircraft design for which numerous magnesium extrusions have provided light weight parts with a minimum of handling. Industrial uses for magnesium extrusions include textile machinery and parts of light office machinery.

Forgings

Forgings made by press or hammer are used primarily today for aircraft engines and gear housings, water tanks, and other small structural and mechanical parts on modern planes. Forging alloys provide better mechanical properties than are available in the magnesium casting alloys and are usually preferable in parts subject to heavier loads.

Machining

The relative softness of the magnesium alloys and their uniformity of structure adapts them particularly well to machining on automatic screw machines. One difficulty in the high speed machining of magnesium which does not exist in the use of any other commercial metal is the fact that finely divided magnesium dust and filings are inflammable, and where such dust or filings are produced special techniques are necessary for fire control.

Welding

Despite the inflammability of finely divided magnesium the metal may be safely and successfully welded through the use of the oxyacetylene flame by the use of a filler rod of the same alloy as the parent metal and with a special welding flux. The repair welding of magnesium castings is, however, much more difficult than in the case of aluminum, but cast or forged magnesium may be welded to magnesium sheet or plate.

Magnesium alloys are readily welded by the electric resistance welding process. Spot welding is successful in the joining of both wrought and cast alloys. Aircraft oil tanks and subassemblies are today being successfully joined by the torch or by electric spot welding. The comparatively high electrical resistance of the magnesium alloys frequently make the electric welding process more economical than riveting. Recently an electric arc welding process using a tungsten electrode surrounded by a shield of helium gas has been developed for joining magnesium alloys. This process results in joints of higher strength than the torch welding process. It does not require a welding flux and may be used for joining magnesium parts by lap, filet and edge welds.

Riveting

High strength in joints is obtained by the use of rivets of special aluminum alloys. These alloys are preferred in order to prevent galvanic action between the rivet and the rivet hold, as the difference in electrolytic potential between certain of the aluminum alloys and magnesium is comparatively slight. Steel, brass and copper-bearing alloys are not suited for the riveting of magnesium assemblies designed for exposure to the weather because of the vigorous galvanic action between magnesium, and copper and iron.

Finishes

In the earlier experimental days, when the properties of the metal were not fully understood, the corrosion of magnesium alloys caused a considerable prejudice against their use. High purity alloys have lately been developed which greatly diminish corrosion under normal atmospheric conditions. Certain zinc-bearing alloys have good resistance to corrosion when exposed to seaboard atmosphere, but in all cases where magnesium products are to be subject to severe atmospheric conditions, particularly along the seacoast, or to air bearing chemical fumes, protective coatings are necessary to insure the permanence of the structure.

Protection of the metal is usually accomplished by a chrome dip which lowers the chemical activity of the surface sufficiently to prevent attack where the metal is not exposed to severe corrosive influences. This chemical treatment, which produces a yellow surface on the alloy, also serves as a paint base where further protection is necessary. Other chemical treatments have been devised for special uses and yield a color range from light gray to dark brown. These chemical coatings have little effect on the hardness or wear resistance of the magnesium alloys, but certain of the treatments do impart special properties such as diminishing the smudging effect of the metal when used in textile machinery.

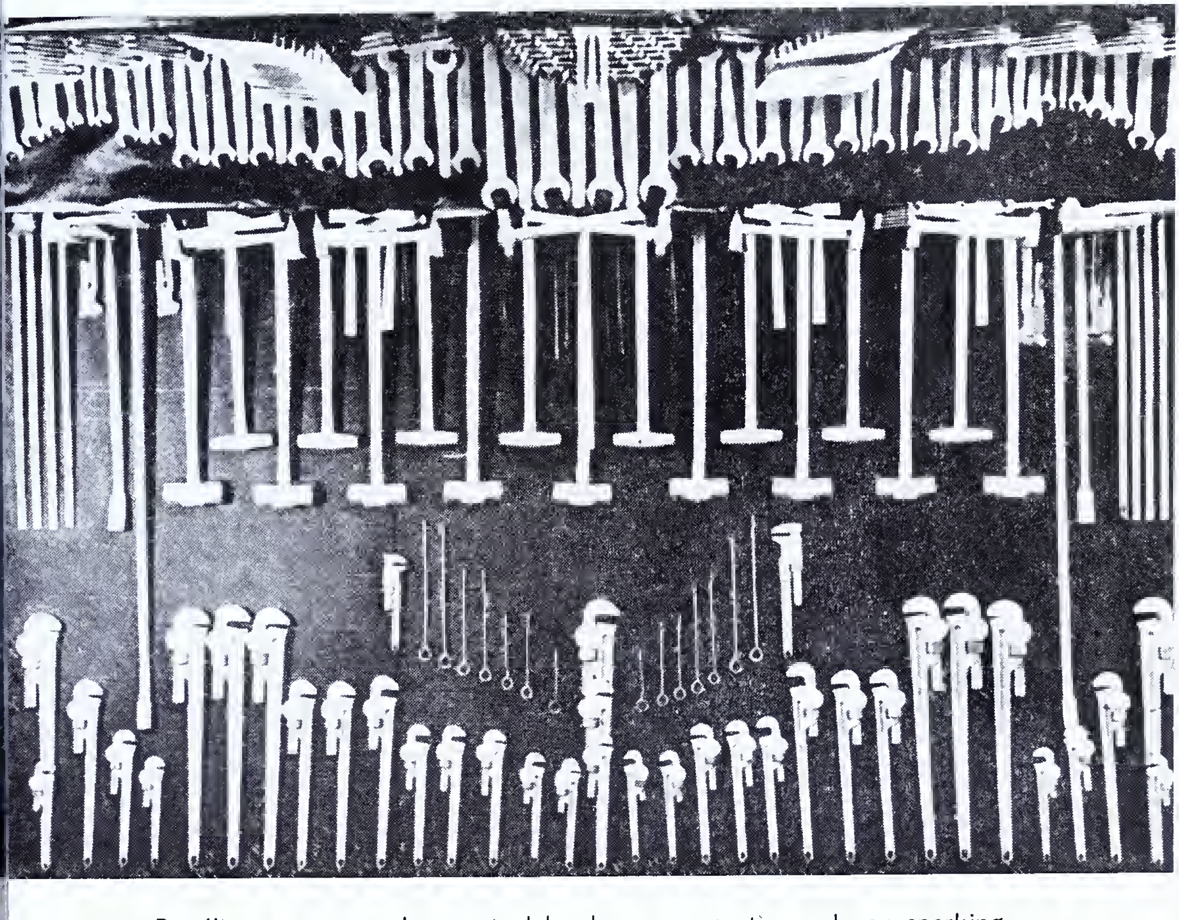
Where magnesium is exposed to corrosive action of salt water or chemical fumes, coatings of paint or lacquer are advisable. Applications of synthetic resins and enamels are particularly effective in protecting the surface of this metal when such exposure conditions are severe. In some applications of the magnesium alloys to textile machinery a coating of hard wax has been found effective in the protection of the metallic surface.

BERYLLIUM

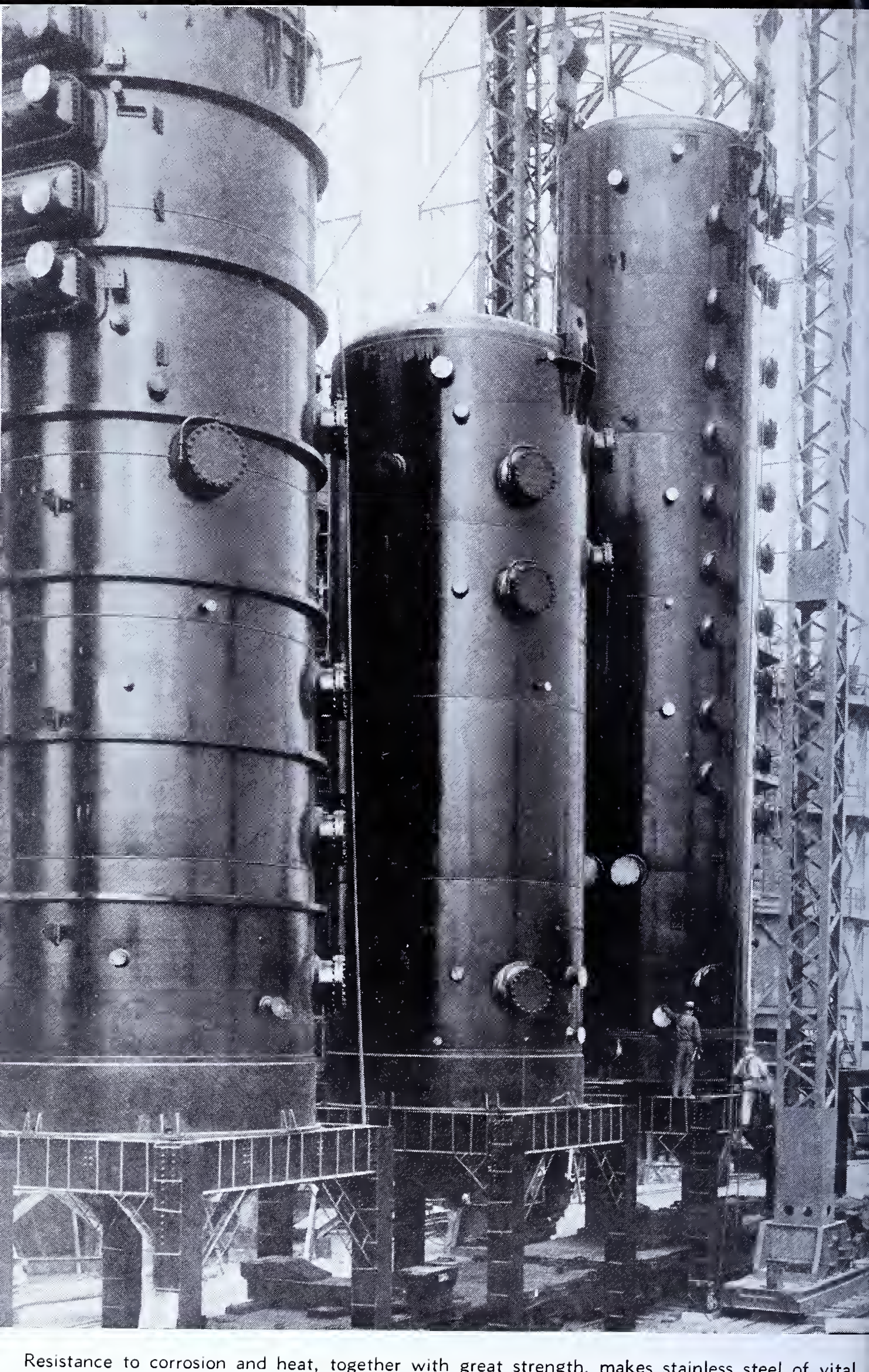
This third member of the trio of modern light metals exhibits properties quite different from those of either aluminum or magnesium. In the first place it is a very much rarer metal. Clear specimens of the mineral beryl from which it is derived are highly prized as gem stones and the emerald, one of the most valuable of all gems, is a color form. As compared with a market price of 20½ cents a pound for magnesium and 15 cents a pound for aluminum, beryllium has a present market price of from $45.00 to $50.00 a pound. While the present cost of production might be reduced by a larger demand, it is hardly likely, under present processes of production, that the cost of beryllium as compared to aluminum or magnesium can be reduced below a hundred to one ratio.

The specific gravity of beryllium is 1.8 or almost precisely that of magnesium. Unlike magnesium, however, pure beryllium is remarkably resistant to corrosion. While the coefficients

Beryllium-copper springs combine great elasticity with low electrical resistance.



Beryllium-copper tools are steel-hard, non-magnetic, and non-sparking.



Resistance to corrosion and heat, together with great strength, makes stainless steel of vital importance in heavy refinery equipment.

of expansion of both aluminum and magnesium are approximately twice that of the ferrous metals, beryllium has a coefficient close to that of cast iron. Another rather outstanding difference between beryllium and either aluminum or magnesium lies in the fact that while the fusion or melting points of magnesium and aluminum are in the range of from 1200 degrees to 1210 degrees Fahrenheit, beryllium passes from the solid to the liquid state at a temperature of 2345 degrees Fahrenheit. Aluminum and magnesium in a commercially pure state are soft and easily deformed while beryllium is extremely hard and more rigid than steel.

Despite this combination of remarkable properties there would be grave difficulties in the use of beryllium as a structural material even if it were available in large quantity and at low price. Except in a state of very high purity, which has never yet been attained in commercial production, this extremely light and rigid metal is characterized by such excessive brittleness or lack of malleability and ductility as to make it useless as a structural material.

Because of this combination of highly desirable characteristics with others which apparently rendered them useless in practical application and also because of the high cost of the metal and the difficulty of its extraction it was not until 1926 that any important commercial use was developed for beryllium, save for a minor application in the metallic elements of X-ray tubes. In that year the fortunate discovery was made that a very small percent of beryllium added to copper, nickel, cobalt, or iron, greatly modified the characteristics of those metals. An addition of 2½ per cent of beryllium to copper produces an alloy six times stronger than commercially pure copper. This alloy has an electrical conductivity 75 per cent better than phosphor-bronze and makes an excellent spring material, particularly for electrical contact devices.

Beryllium copper is readily punched and formed in its soft state and attains its maximum hardness by a simple heat treating process after which it becomes a spring material superior to steel in electrical conductivity and superior to phosphor-bronze in its resistance to fatigue. This has led to its use in aviation altimeters and in the springs of pressure gauges where high stability of spring properties is demanded. The alloy is also valuable for friction and wear resisting parts such as roller sleeves, bushings, and cams.

Other alloys of beryllium and copper with a fractional percent of cobalt combine high electrical conductivity and heat resistance with great hardness and high tensile strength. Springs of a cobalt copper alloy containing ½ of 1 per cent of beryllium have been vibrated 5,100,000 times at a stress of 70,000 pounds per square inch without failure.

Castings of certain beryllium-cobalt-copper alloys have been used successfully for heavy shaft bearings, for metal forms and embossing dies, for plastic molds, and for roller bearings and trolley wheels.

Because of the great hardness and tensile strength and the non-sparking characteristics of the beryllium copper alloys they have been employed with great success in the manufacture of tools for use under conditions where inflammable dust or gases constitute a fire or an explosion risk.

Beryllium nickel alloys represent the extreme of tensile strength and fatigue resistance. The further development of these alloys, which are readily formed in a soft condition and hardened by heat treatment is an immediate prospect for a new structural material of extremely high strength and rigidity.

Beryllium and magnesium have not as yet formed alloys while the alloys of beryllium and aluminum have not so far proved of sufficient commercial importance to warrant the additional cost of their production and handling, or the increased difficulties of casting techniques.

The use of beryllium as a hardening and stiffening component in ferrous and non-ferrous alloys is one of those industrial developments which is likely to prove of steadily increasing usefulness in the post-war world. The availability of a nonmagnetic alloy as hard as steel is today important in the design of fittings and instruments for airplanes. These properties of copper-beryllium may also prove useful in certain types of marine architecture. A spring metal of very high resistance to fatigue and of uniform performance is an invaluable addition to the materials of industry, and a die forming metal which can be cast and worked soft and afterwards hardened by simple heat treatment may prove of great use in various types of fabrication for both the plastics and the light metals.

THE STAINLESS STEELS

A rust-resisting metal, which would combine the hardness and toughness of steel with a smooth bright surface immune to the attack of atmospheric oxygen, was a goal long sought by the chemists of the 19th Century. When this problem was finally solved by the discovery of a stainless steel it was obvious that the use of the ferric metals had been extended into a field which they had never successfully occupied before. The easy rusting of iron and of all the common forms of steel had always been a serious handicap to their use in domestic appliances, in architectural trim, in chemical containers and in laboratory and plumbing equipment. It was, however, generally recognized that many of the other properties of iron and steel would make their use for all these purposes highly desirable, if the handicap of rust and corrosion could be overcome. They are tough and elastic. They have a high melting point. They can withstand high temperatures and high pressures simultaneously. They possess structural rigidity and a variety of other useful properties which make the steels the most universal of all metal products and the most useful to man.

Unfortunately iron and most of its compounds have an intense affinity for oxygen and for other chemical elements. When exposed to the atmosphere, to water, particularly salt water, or to many common chemical fumes or solutions they dissolve or corrode, sometimes with great rapidity. When the discovery was made that some types of very high carbon steels were resistant to atmospheric corrosion the door was open to a greatly widened use of such stainless steel in the manufacture of industrial and consumer goods. Other metallurgical investigations led to the discovery that a considerable percentage of the chemical element chromium combined with iron provided an alloy which retained its bright surface under severe conditions of exposure to most chemicals and to atmospheric oxygen.

The protection afforded by the addition of chromium to iron is due to the formation of a thin film of protective oxide on the surface of the alloy. This film, while only imperceptibly diminishing the brightness of the metal, protects it against further action by most corrosive chemicals. The resulting product, stainless steel, is one of the 20th Century's most valuable industrial materials since it provides a wide range of properties common to other steels, with high immunity from chemical attack, and a pleasing and decorative surface. The addition of nickel to this iron-carbon-chromium alloy supplies other properties and greatly extends the range of usefulness of these tough bright metals.

Today, in hundreds of uses, from great streamline trains to household cooking utensils and in many types of military equipment the various forms of stainless steel have become familiar to us all.

Types of Stainless Steel

Almost all of the alloys now known as stainless steel contain in various proportions iron, carbon, and chromium, while one important class of these alloys contains from seven to twenty-one percent of nickel. Other elements such as manganese, silicon, columbium, titanium, and bismuth impart special properties to the steels. It is impossible, within the space of such a survey as this, to deal in a detailed way with the technicalities of the metallurgy and chemistry of the stainless steels. Technical literature is available from many Pennsylvania firms, since our State is the leading producer of various types of alloy steels.

In this booklet it is the application of these raw materials to consumer and industrial use in the post-war years that is the matter of chief concern. Properties of these metals are important only as they bear upon the resulting range of possibilities, or on the limitations imposed by those properties in comparison with other industrial materials.

One important fact that must constantly be borne in mind in the application of a particular stainless steel to any given industrial or consumer use is that the proportion of chromium necessary to provide protection against staining and corrosion depends usually upon the extent to which oxidizing agents are present under conditions of use. Without the formation of an oxide film on the metal surface the stainless steels are as subject to attack by chemical agents as any other type of steel. For this reason the greater the anticipated exposure to oxygen under conditions of service the lower the chromium content necessary to protect the metal. Under conditions where the metallic surface is only lightly exposed to oxidizing agents, a very much higher chromium content is necessary in the alloy in order to form the necessary protective film. Under normal atmospheric conditions a 12% chromium alloy is stainless, but as the conditions of service become less and less oxidizing a successively higher chromium content is necessary in order to promote the formation of an oxide.

A valuable property of the stainless steels is their resistance to scaling at higher temperatures. This property is due to the refractory nature of the oxide film formed on the metal surface A 12% chromium alloy resists scaling under normal conditions up to a temperature of 1400° F. To prevent scaling at still higher temperatures the chromium content must be raised.

THE CHROMIUM-IRON ALLOYS

Various properties are available in the chromium-steel alloys depending upon the proportion of carbon and chromium in their composition. Some are particularly adapted for use at high temperatures. In these alloys the proportion of chromium may rise as high as 28%. Some are extremely resistant to corrosion and are applicable to the manufacture of cutlery, to use in oil refineries or to the manufacture of ball bearings. Some are especially adapted by their high elastic limit and high impact value to the manufacture of turbine blades and retain their stainless properties under the severe heat and moisture conditions of that service. Some are particularly suitable for the bright trim and finish on automobile parts, for the surface covering of airplanes and streamline trains and for the manufacture of chemical apparatus. Some require heat treatment in order to obtain optimum toughness and others are air hardening at normal atmospheric temperatures.

The addition of molybdenum or tungsten to the iron-chromium alloys increases the tensile strength of the metals at high temperatures. Aluminum and copper when combined in an alloy increase resistance to oxidation at high temperatures and largely prevent acid corrosion, while columbium prevents air hardening.

THE CHROMIUM-NICKEL-IRON-ALLOYS

The chromium-nickel-iron alloys present several advantages but also offer certain difficulties in handling and fabrication. Nickel improves the stability of the oxide film on the steel surface and renders its formation easier. It also affords the possibility of increased ductility, toughness and strength at elevated temperatures. It is, however, necessary in many cases to subject such alloys to heat treatment to prevent intergranular corrosion within the metallic structure. The addition of columbium or titanium to certain of the chromium-nickel-iron alloys effectively prevents such intergranular corrosion. Special types of the high nickel, as well as of the iron chromium steels have been developed for vessels used in the preparation of various chemicals and have proved particularly valuable in the construction of apparatus for the manufacture of modern plastics and in the synthetic rubber industry.

It is obvious from these very preliminary observations that the selection of a type of stainless steel for any given industrial purpose is a matter requiring technical advice. The reaction of the various stainless alloys to all common chemical compounds has been made the subject of careful experiments, and it is important to remember that the term "stainless steel" covers a variety of metals with a wide range of physical and chemical properties.

METHODS OF FABRICATION AND HANDLING

Welding

In general, the stainless steel alloys containing nickel as an important constituent require a different welding technique from the chromium alloys. The straight chromium alloys have a melting point slightly lower than that of mild steel. They are poorer conductors of heat than carbon steel and have a much higher electrical resistance. They are stable over all temperature ranges, but tend to become brittle at welding joints through air hardening and generally require annealing after fabrication to restore their initial toughness. The chromium steels containing a higher percent of chromium (above 20%) are not subject to air hardening, but are likely to become brittle as a result of grain growth if held at a temperature above 1750° F. Such grain growth, if once established, cannot afterwards be remedied, but heat treatment can remove much of the brittleness due to slow cooling at the weld joints.

The chromium nickel alloys are somewhat different in behavior and more extreme in their properties. Their co-efficient of expansion is roughly 50% greater than that of the common carbon steels, while their heat conductivity is approximately 50% lower. Their electrical resistance in the annealed state is approximately six times that of carbon steel, and in the cold work state rises to as much as twelve times greater. Higher expansion with lower heat conductivity creates welding difficulties such as high temperature at the welding joint and a tendency toward distortion because of this high co-efficient of expansion. Their high electrical resistance, however, favors the use of electric welding methods, which can be performed on these alloys with unusual speed.

These latter steels are all of the class known as austenitic. That is, their structure is a solid solution of carbon in iron, while the straight chromium steel alloys, when annealed, have what is known as a pearlite-ferrite structure. The difficulty in welding the nickel chromium stainless steel lies in the necessity of preventing carbide precipitation at the grain boundaries during heating in the temperature range between 800° and 1500° F. This is particularly important where the final product is subject to severe corrosive conditions. For such purposes alloys containing columbium or titanium are to be preferred and eliminate the necessity of later heat treatment since the addition of those metals results in the formation of carbides not subject to intergranular corrosion. Welding electrodes and welding rods made with a columbium bearing alloy are generally preferable to those containing titanium. For the fabrication of welded articles that are to be used at high temperatures columbium-bearing alloys welded with columbium electrodes or welding rods provide the best insurance against corrosive changes.

It will be obvious from the foregoing brief discussion that the welding technique to be employed with any particular stainless-steel alloy for any given purpose must consider the temperature range under which the product is finally to be used, the corrosive conditions it may be subject to, and the composition of the alloy itself. All these are matters which have been made the subject of extensive experiment by the various producers of the stainless steel alloys from whom ample technical data may be had.

Methods of welding employed include metallic arc welding with either direct or alternating current, acetylene welding, which is generally not recommended on the straight chromium alloys, atomic hydrogen welding which is an alternating current arc-welding process in which the welding heat is obtained from an arc between two electrodes in an atmosphere of hydrogen, and electrical resistance welding, which is particularly recommended for use with the chromium-nickel alloys whose high resistance and low heat conductivity make it possible to perform the operation with great speed.

Drawing

The chromium-nickel alloys are particularly suited to forming and drawing operations because of their high tensile strength and ductility. They are stiffer than ordinary steel and harden more rapidly under cold work. They are best drawn or blanked in the dead soft or annealed condition. Since these steels are of higher strength and have higher elastic limits than plain steels, increased power and heavier die construction are frequently necessary in forming operations.

Machining

Since the chromium nickel steels are tougher than the plain steels increased power is also necessary in machining operations and particular precautions must be taken to prevent work hardening by the riding of tools or drills during machining. Slower speeds and heavier feeds than are required for operations on plain steels are frequently necessary. Tool edges need to be sharp to maintain continuous cutting at all times.

The straight chromium alloys are not subject to cold work hardening and may be more rapidly handled. Certain of the chromium alloys have been developed with free machining characteristics for particular types of work.

Spinning

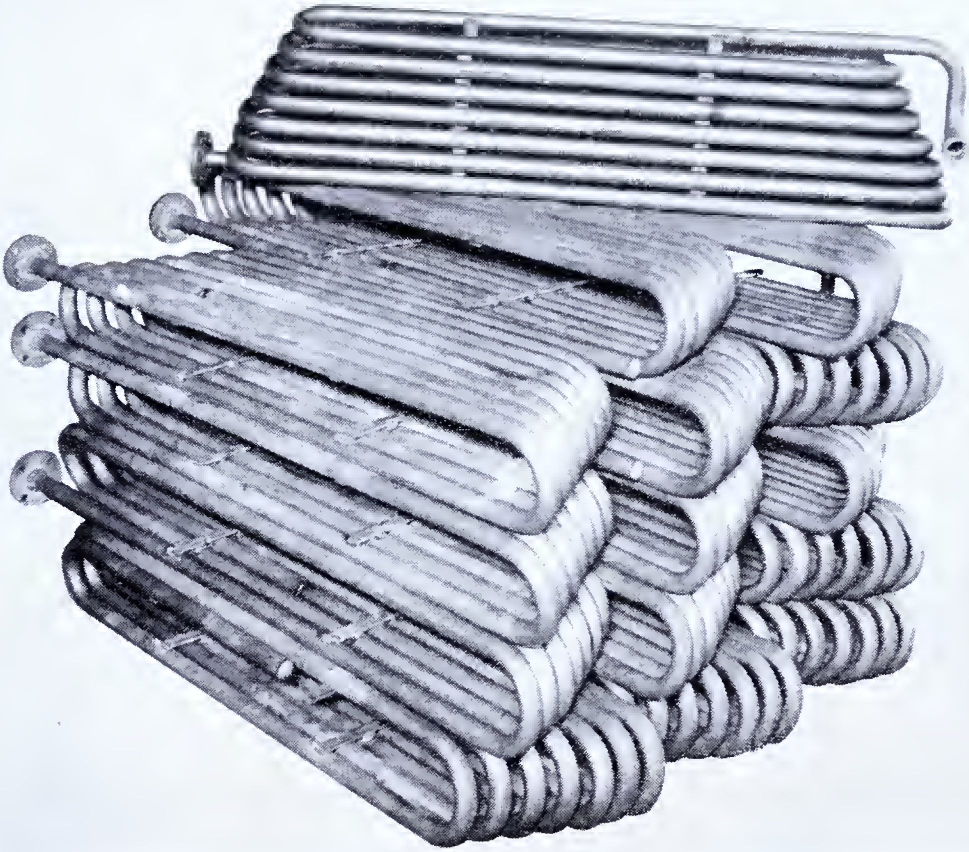
More power is required for spinning stainless steels than is necessary with either copper or aluminum, and a lower speed is necessary in the operation. Since the chromium nickel steels progressively develop increased strength and hardness during spinning, heavier equipment is frequently necessary in handling these metals, and frequent heat treatment or annealing is often necessary.

Forging

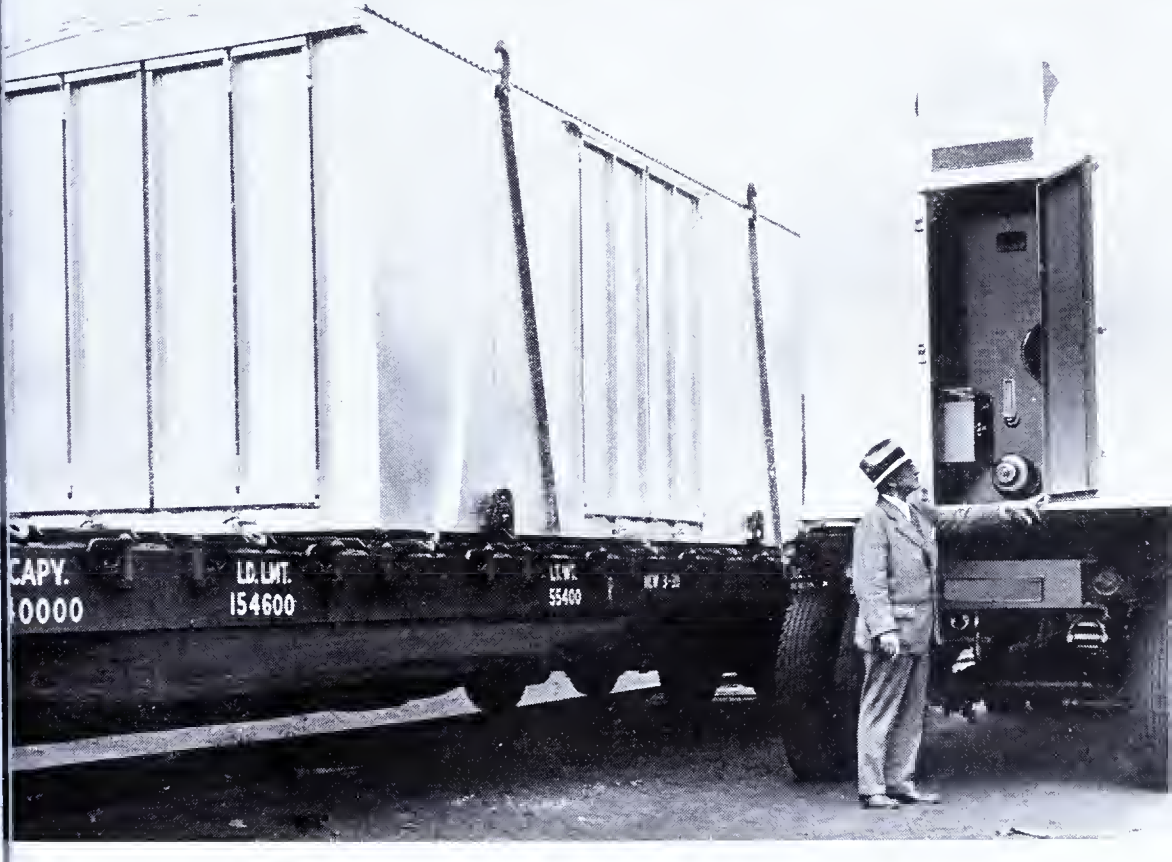
Forging operations present no particular difficulties, though the various alloys require attention as to their special characteristics within the range of temperatures at which they may be safely worked.

Soldering and Brazing

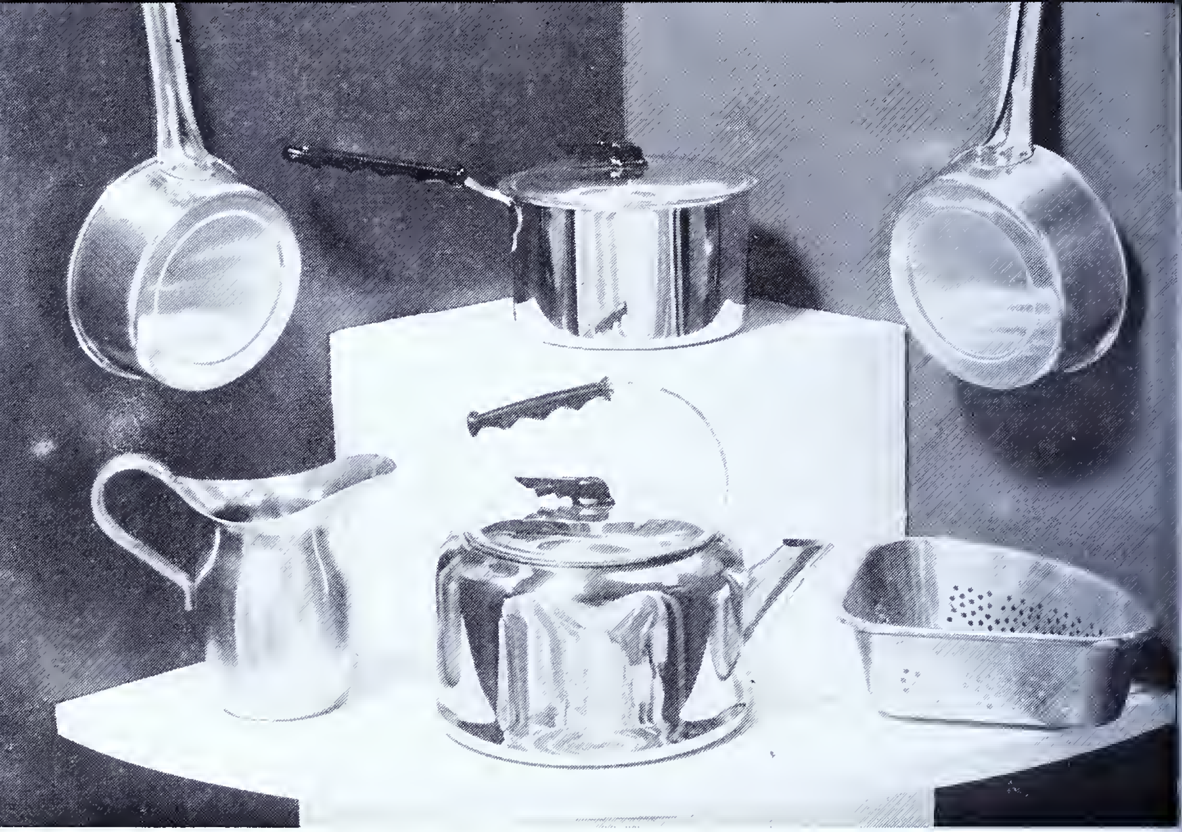
Either the chromium or the chromium-nickel alloys can be soldered either with soft tin-lead solders or with silver solder. This latter process is particularly adapted for use on the chromium nickel alloys and yields joints of high strength. Since silver solder has a melting range within the carbide precipitation range of the chromium-nickel alloys, it is necessary to perform silver soldering operations on these alloys as



These stainless steel coils helped win the battle of synthetic rubber.



Stainless steel tank trucks offer light weight, extreme strength, and freedom from corrosion.



Stainless steel kitchen equipment is durable and attractive.

Beautiful table and gift ware is made from stainless steel.

rapidly as possible and preferably to make use of columbium-stabilized chromium-nickel alloys to avoid the danger of brittleness through the formation of carbides at the joints.

Riveting

Chromium nickel and chromium stainless alloys can be riveted, but the operation must be performed with due regard to the characteristics of each type of alloy. At diameters under 3/16 of an inch rivets may be driven cold, preferably by a single blow rather than by a succession of lighter blows. Above 3/16 of an inch in diameter most of these alloys are preferably riveted hot within temperature limits depending on their individual characteristics.

Surface Finishing

In many types of industrial and consumer's goods, such as vessels for food processing and chemical operations, a high degree of polish is often necessary on the metallic surface. As compared with the light metals grinding and polishing operations on the stainless steels require greater force to remove surplus material, and special precautions to prevent the introduction of foreign matter into the metallic surface during the grinding operation. In heavy grinding, precautions need to be taken against both burning and distortion due to the low thermal conductivity and high co-efficient of expansion of these metals. It is important to remove all traces of scale, flux, or spatters from around welding joints to avoid local corrosion and also necessary to eliminate all surface marks of grease, oil, or fingerprints before any annealing or finishing operation, in order to insure a bright and satisfactory metallic surface.

For the removal of scale or oxides various pickling solutions usually consisting of solutions of nitric and hydrofluoric acid are recommended by producers of the stainless alloys for final surface treatment under special conditions. An anodic finish similar in effect to that used for the surface treatment of aluminum has also been developed. It yields a bright corrosion resistant finish on the chromium nickel grades and a somewhat less brilliant surface on the chromium grade alloys.

Various methods of passivating or rendering the surface of stainless steels chemically inert have been developed to increase the resistance of the metals to special forms of corrosion. Such protective surfaces are, however, subject to breakdown through certain chemical agents or through physical strain and are not permanent.

APPLICATIONS OF STAINLESS STEEL

As has already been repeatedly stated in this summary no one type of industrial material is likely to dominate the future of manufacturing. While the stainless steels and the light metals have frequently been applied to similar uses in the construction of streamline trains, in the bodies of automobiles and motor buses and on the fuselages and wings of airplanes, as well as in numerous types of domestic equipment, the competition between these types of materials is always a matter of the choice of desired qualities.

The light metals cannot compete with the steels in surface hardness, nor in any uses where conditions of high temperature must be encountered. The melting point of the stainless steels ranges betwen 2550 degrees and 2730 degrees Fahrenheit at which temperatures both aluminum and magnesium exist only as gases. The stainless steels have a very high electrical resistance and cannot compete with aluminum as a substitute for copper in the construction of electrical conduits. On the other hand, the characteristic of aluminum to flow under strain would render the use of any known light metal alloy impracticable as a self-supporting electrical conduit over long suspensions. Here, as in many other modern uses, the two materials augment each others characteristics. An electrical conduit in which a steel core lends tensile strength to a low resistance aluminum cable has come into very general use.

It is likely that in the construction of airplanes, automobiles, trucks, and motor buses, as well as in the exterior and interior of modern trains, the marriage of these two groups of bright metals will be finally effected and that by such a union a lighter, stronger, and more beautiful product will finally be evolved than would ever be possible from either of the two types of metal alone. Wherever lightness is of itself a vital characteristic, as may be true in some types of domestic equipment and in important parts of airplane structures, magnesium and aluminum seem likely to have a little challenged field. Wherever toughness, high elasticity, surface hardness and high temperature performance are vital the stainless steels appear to have advantages over all other known materials. In the very large field of chemical apparatus, where extreme resistance to corrosion must be combined with either high temperatures, high pressures, or both, the stainless steels have added immensely to our capacity to produce a variety of synthetics of great use to man. This is particularly true in the manufacture of the various types of artificial rubber, and will also be true when the production of gasoline and fuel oil from coal becomes of commercial importance in the United States.

The earliest application of the stainless steels to the valves of airplane engines illustrated one direction in which their development has proceeded. The scoring and pitting of valve parts under the high temperatures of motor exhausts was for a long time a bar to further progress in the perfection of both the airplane and the motor car. A special type of stainless steel solved that problem.

In the development of steam boilers and other engine parts where great heat must be endured and a resistance to scale and corrosion maintained, the stainless steels have done much to increase the efficiency of our great prime movers. Stainless steel cooking utensils, sinks and other kitchen equipment have come into extensive use. Similar equipment on a larger scale has proved of vital importance in the plastics industry, in preparing and sensitizing photographic film and in food packing where the ability to withstand high pressures and temperatures without corrosion is important. Stainless steel cutlery and surgical implements represent a great advance over all other available materials. Stainless wire products, including wood and machine screws, cable, rope, dental tools, spectacle frames, chains, window screens, refrigerator trays, and even jewelry will be of great importance in our future peace-time manufacture. Spring wire of stainless steel, offering freedom from corrosion with high temperature performance is another product of this metal, but wherever low electrical or thermal resistance is essential in a spring metal the beryllium coppers will necessarily be preferred.

The stainless steels cannot be as easily machined or as rapidly spun or drawn as some types of the light metals. They do not have the sound deadening characteristics of magnesium. Their fabrication is, in general, more difficult than that of the light metals and the casting of the steels requires higher temperatures. They do, however, provide for the world of the future a tough, hard, beautiful and dependable servant to many of the most important arts of man.

THE METALS OF TOMORROW

It is impossible to summarize briefly the contrasting characteristics of the several groups of metallic alloys which we have been considering in this introduction. This much, however, can be said. The magnesium alloys are the softest and lightest of all available metallic raw materials. They are easily corroded, have a low fusing point, and are subject to certain fire hazards during fabrication, but on a strength to weight basis rank very high and provide a material adapted to many important industrial uses wherever light weight, low inertia, or sound deadening properties are of first concern or wherever ease of machining is a decisive factor.

The aluminum alloys have a wider range of properties. They are far less subject to corrosion than the magnesium alloys and yet have a sufficiently high strength to weight ratio to be of extensive use in transportation equipment and in architectural trim. Their comparatively low electrical resistance suggests them for use in certain electrical apparatus including wire and conduits. They have also proved their value in the construction of light weight domestic equipment and cooking vessels and in many important types of chemical apparatus.

The beryllium coppers combine hardness, high elasticity, and low electrical resistance in non-magnetic and non-sparking alloys whose fields of usefulness are being rapidly extended.

The stainless steels of the two types discussed in this booklet exhibit a very wide range of properties which include a high melting point, a surface harder than that of mild steel and an immunity to atmospheric and to most types of chemical corrosion, combined with great tensile strength, high elastic limits and high impact value. Many of these properties are retained at elevated temperatures.

It may be said of all these alloys that the extent of their application to the needs of man has never yet been fully explored. In the production of many of these materials Pennsylvania leads America and in some it leads the world. To this list could be added, the various brasses and bronzes. the stellite alloys, the nickel silvers and the monel metals, which in some uses are also competitive to the light metals and the stainless steels. But the list is in fact endless. Of one thing we can be certain, Pennsylvania's manufacturers will never lack an almost unlimited variety of materials from which every conceivable type of consumer and industrial goods may be produced. On their ingenuity and enterprise in applying to the needs and the problems of the post-war world this vast battery of material resources rests their great opportunity.

If in the years to come this increased wealth of materials is applied to the reduction of cost and the simplification of design so that the market for industrial products extends further and further into the lower income groups it will have provided the way for that general participation in the advantages of machinery which alone can make permanent the progress of the great industrial age which lies before us.

On the following pages are tabulated a few outstanding characteristics of the vast range of metallic and non-metallic industrial materials which will become available for civilian manufacture at the close of the war. All those materials starred in this list are produced in quantity in this Commonwealth. The advantages of transportation and economy of handling which this fact affords will make their application to the needs of the State's manufacturers particularly advantageous.

Acknowledgment is made to the several Pennsylvania producers of light metals and stainless steels who have supplied technical data for use in this issue, and particularly to the Aluminum Company of America, the Magnesium Corporation of America, the Beryllium Corporation of Pennsylvania, the Alloy Manufacturing Company, Inc., and the Allegheny Ludlum Steel Corporation for photographs accompanying the text.

RANGE OF CHARACTERISTICS—TYPICAL INDUSTRIAL MATERIALS

Material (1)	*Density* (2)	*Degrees Fahr. Fusion Point* (3)	*Ultimate Tensile Strength* (4)	*Tensile Yield Point* (5)	*Brinell Hardness* (6)	*Electrical** Conductivity* (7)
Hard Maple*	.67		10,200	3,000		
Polystyrene	1.05—1.07	240—280	3,000— 8,500			
Laminated Phenolic* Plate, Fabric Base	1.10—1.25	320	5,000— 12,500			
Nylon Molding Materials	1.14		9,000			
Cellulose Acetate* Molding Compounds	1.27 x 1.36	252—342	1,700— 8,300		1.5—12.	
Phenolic* Molding Materials	1.27—2.00		3,500— 9,500			
Magnesium Casting Alloys	1.81—1.84	1075—1200	14,000— 39,000	4,500— 22,000	33— 78	10—15
Magnesium Wrought Alloys	1.76—1.82		32,000— 53,000	14,000— 38,000	40— 85	10—34.5
Aluminum* Casting Alloys	256—280	1130—1210	19,000— 48,000	9,000— 42,000	40—140	21—39
Aluminum* Wrought Alloys	2.64—2.91		13,000— 73,000	16,000— 57,000	23—116	30—61
Malleable Iron*	7.33	2795	57,000	37,500	130	6.
Cast Carbon Steel*	7.85	2750	75,000	42,000	230	11.
Structural Steel*	7.85	2765	60,000	38,000	150	12
Chromium Stainless Steel* (Annealed)	7.92	2650—2750	60,000—105,000	35,000— 90,000	180 Max.— 250 Max.	11.3—23.2
Chromium Stainless Steel* (Heat Treated)			60,000—270,000	35,000—220,000	120—600	
Nickle-Chromium Stainless Steel* (Annealed)	8.00	2500—2600	75,000—100,000	35,000— 40,000	180 Max.— 200 Max.	10.1—11.9
Nickle-Chromium Stainless Steel* (Work Hardened)			250,000 Max.— 350,000 Max.			
Beryllium Copper*	8.23	1751	66,000—200,000	18,000—179,000	52—240	25—70
Beryllium Nickle*	8.36	2490	114,000—270,000	52,000—238,000	140—480	5.1— 8.9
High Brass*	8.47	1715	45.000— 75.000	12,500— 45,000	52—153	25—30

* Produced in Pennsylvania.

** Per cent. copper unit volume.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols., 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.
*Defense Problems, January-March, 1941.
*Post Defense Problems, April-June, 1941.
Index of Publications, August, 1941.
*Community Self-Appraisal (Revised Edition), April, 1942.
*Comparative County Data, May, 1942.
*Planning and Zoning Progress in Pennsylvania, July, 1942.
*Population, October, 1942.
*Handicrafts in Post-War Planning, May, 1943.
*Plastics, July, 1943.
Air Photographs, February, 1944.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

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DOCUMENTS SECTION

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To inform those who
are interested and
to interest others.

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Local Self-Development and Self-Protection

¶ This issue of Pennsylvania Planning is devoted to a few typical examples of self-development programs carried out by communities in the Commonwealth who are facing, through local action, the problems of better living and of expanding their industry and employment. It has appeared feasible to present a few instances rather than many and to illustrate, so far as the limitations of space permit, the various types of motive and accomplishment which have marked the programs adopted and carried through on the several levels of local government.

¶ **The Borough of Chambersburg** and the **cities of Williamsport** and **Lancaster** have been selected as examples of successful self-development programs by communities largely dependent upon their local industry.

¶ The discussion of community self-development in **Lower Merion Township** deals very largely with the problems of a suburban community containing important industry, but largely devoted to residence and trade. In such a community land-use planning, control of traffic, the zoning of residential, business and industrial areas, and the provision of adequate recreation and public facilities are the outstanding problems.

¶ The program of the **Shenango Valley** represents an effort at regional cooperation including two cities and a number of satellite towns all with a common interest in the industrial and residential development of an area in the extreme western part of Pennsylvania where basic conditions are quite different from those encountered by communities in the eastern half of the Commonwealth.

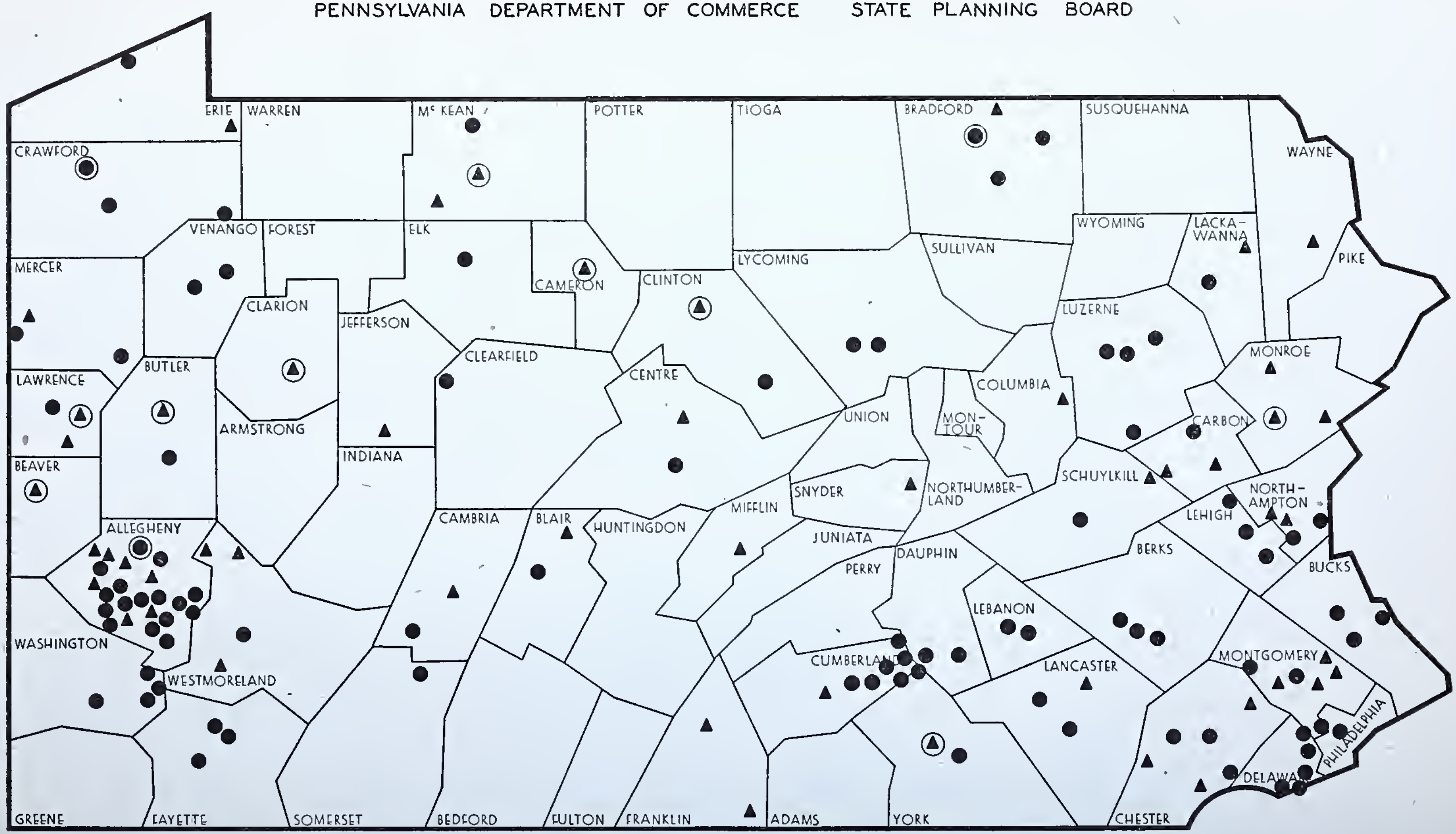
¶ A second and necessarily more ambitious program of regional development is that illustrated by the activities of the **Allegheny Conference on Community Development** which includes all the boroughs and cities within the borders of America's greatest steel-producing area.

¶ The **City of Philadelphia**, the largest urban community in the Commonwealth and the third largest in the United States, has lately embarked on an extensive program of city planning and urban redevelopment which includes a consideration of the industrial, commercial, and residential problems of this great community. How it has approached the complex needs of a great city facing the postwar years may offer important hints to smaller communities whose problems are not so extensive.

¶ The planning and zoning program of **Crawford County** must also be mentioned in this survey because of the successful demonstration by the county authorities of the possibility of local self-protection through the use of existing laws, and because of the pioneer application of air photography to the problems of local government.

LOCAL PLANNING AGENCIES IN PENNSYLVANIA

PENNSYLVANIA DEPARTMENT OF COMMERCE STATE PLANNING BOARD



CONTINUING OFFICIAL AGENCIES

● LOCAL PLANNING COMMISSIONS

TEMPORARY QUASI-OFFICIAL AGENCIES

▲ LOCAL POSTWAR PLANNING COMMITTEES

An Example of Intelligent Local Adjustment

Occasionally a community takes a realistic attitude toward its future and, never having been told that they could not plan, its people proceed to do an honest workmanlike job of community adjustment. This is the story of one of those communities. It is the record of what happened in Chambersburg, Pennsylvania, when the townsfolk decided to do something about their own future.

Chambersburg is an attractive and historic little city of 15,000 people lying at the southern end of the Cumberland Valley, just a few miles from the Mason-Dixon line. It is the county seat, the retail shopping center for the area, and the hub of a rich fruit-growing region. Its industries are vigorous and diversified with the emphasis primarily on machine tools, metal products, foods and textiles. The coming of the war stimulated but did not appreciably alter the local industrial pattern. However, a government ordnance depot, erected within a few miles of the city shortly after Pearl Harbor, increased the local demand for labor by 1,100 people. The necessity for bringing in an emergency work force was avoided by hiring people from the surrounding countryside and by getting residents of the city to accept part-time work at the depot. Hence adjustment to peace will find the community in a relatively favorable position. Its industries can convert to civilian production without difficulty; there is no swollen labor force to disperse or to find employment for; and the demand for local products seems assured. If any community has a right to be complacent it is Chambersburg.

But Chambersburg has refused to be complacent. Its people know that new plants, new techniques and new products have created an unprecedented challenge for the economy of Pennsylvania. And they also know that alert industrial communities throughout the East are already beginning to adapt to the post-war pattern. But what is the post-war pattern so far as it affects Chambersburg? When specific figures were called for, no one could produce many of the pertinent facts. Clearly, before the city could plan, it had to know what it was planning for and what it was planning against.

In December, 1943, the Chambersburg Chamber of Commerce created what it calls a Community Development Committee and authorized that Committee "to prepare data and ideas which will be useful to the community at the end of the war." That title is, by the way, significant. It is a *community* committee because under the terms of its charter it is truly representative of the community. People from all walks of life were drawn into the Committee solely on the basis of their knowledge and their relationship to the community itself. Secondly, it is a *development* committee because it is concerned not only with immediate post-war economic problems but with all of the varied and complicated issues faced by the community within the definable future. It is, in short, not a temporary job-finding agency but a permanent aid to intelligent community action.

A large measure of the success of the Chambersburg Committee has been due to the fact that the right people were selected for the job. The men and women chosen for committee membership constitute the accepted local leadership in the various phases of community life. Each has worked long and conscientiously for a better understanding of mutual problems, and their activity as committee members provides new evidence of the important part the human factor plays in all democratic action. Any community that would duplicate Chambersburg's record must start by creating a committee staffed by men and women of ability, imagination and energy Without such leadership little of worth can be achieved.

The high calibre of the Chambersburg group can be gauged from the policy it defined at the first meeting of the Committee. "The Committee has no power. It is, rather, a fact-finding body only, interested in making known the conditions which all will face at war's end. . . . Committee activities are advisory only, and will consist of . . . fact finding, . . . encouraging and aiding all persons, organizations, and firms in the formulation of post-war plans, . . . and making the facts and conclusions developed by the Committee available to all interested persons."

This pattern was not an accident. It followed extensive discussion of the role of such a committee in a democratic society. And it rests on the sound observation that the average man occasionally errs in his judgments, not because he is hopelessly stupid but rather because he lacks information essential to sound action and has no reliable source of local data to which to turn. If for no other reason, the Chambersburg Committee would be outstanding because it has enough confidence in democracy to trust the judgment of an informed public and because it understands the importance of reliable facts to an effective democracy.

To implement this program of fact-finding, a series of operating sub-committees was created with one member of the executive committee selected to head each of these groups. These sub-committee chairmen then selected additional people from the community to help them with their fact-finding. Once organized, each sub-committee made its own decisions as to its method of procedure, points of specific investigation, and the method of presenting its findings to the executive committee. Here again the Chambersburg group made planning history.

Take the sub-committee on publicity for example. While the publicity committees of post-war planning groups in some cities were boasting of the good their organization was going to do *to* the public, the Chambersburg sub-committee was resolving not to shout until it had something to shout about. A brief notice of the nature and general functions of the Committee was printed in the local paper and then the publicity group set about finding something constructive to do. It did not have far to look. Preliminary inquiries by the other sub-committees had very early made it clear that the present and the future of any community were rooted in its past. Yet when each committee tried to trace the history of its own segment of the community record, it found a remarkable dearth of information. So the publicity committee agreed to accumulate the facts and then to write a social and economic history of Chambersburg in order that the present might learn from the past how to plan intelligently for the future. Facts turned up by the other sub-committees were to be turned over to the Publicity Committee for inclusion in the record.

Thus it happened that a factually accurate and extremely illuminating local history took the place of the usual publicity committee's scrapbook of grandiose and meaningless press releases. Many a time-worn illusion about the community was blasted. Conditions auguring both good and ill for the future were found in unexpected quarters. And a well organized, well written and reliable record of past successes and failures now gives Chambersburg a perspective that could not have been obtained in any other way.

Not until all of the sub-committees were ready to report to the townspeople did the publicity committee begin to publicize. Then it avoided glittering generalities because it had an array of facts to place before the community that were significant enough to speak for themselves and for the Committee too, which is publicity in the best and most constructive sense of the word.

Meanwhile the other sub-committees were just as active. The sub-committee on employment had responsibility for measuring post-war employment prospects in Chambersburg and for seeing what could be done to insure a good job for every returning soldier and for anyone else who wanted work. The sub-committee on markets and trade was making a similar job check throughout the non-industrial parts of the local economy. Ultimately both the sub-committees pooled their findings and reported a probable post-war deficiency of jobs for men and a probable post-war surplus of jobs for women. These facts established, both sub-committees set about finding the advantages and disadvantages of possible adjustments for the problems thus posed.

Because of the importance of agriculture in the economy of the region, an eight-man agricultural committee was created. A surprising paucity of statistics made the work of this group particularly difficult. Nonetheless they were able to determine a probable post-war deficit of farm workers. They also discovered a serious dearth of young farmers which, on inquiry, proved to be largely due to the difficulty young people have had in financing the purchase and implementation of the high-grade farms of the region. Feeling that "young farmers are . . . the basis upon which our agricultural community can remain young and aggressive" this sub-committee turned for help to the sub-committee on finance. Between them, these two sub-committees made a careful survey of all available local sources of credit and ultimately worked out a program for helping eligible young men to buy and equip good farms. At the same time the agricultural sub-committee made a careful study of the trend of agricultural production in the region, of war-time developments in production methods, and of recent shifts in markets that are apt to effect post-war farming. These data form an invaluable basis for the profitable adjustment of local farmers to the peace.

The aid rendered the agricultural sub-committees by the sub-committee on finance is notable. While finance committees elsewhere were staging big rallies to raise post-war planning funds for undetermined projects, the Chambersburg Finance Committee was thought of not as a cash-raising agency but as a source of sound financial advice in working out post-war adjustments. For example, when the sub-committee on civic development concluded that Chambersburg was badly in need of a Community Center, the finance committee was consulted concerning the soundest way of financing the project. This is almost a revolutionary conception of the duties of a finance committee because it puts the emphasis not on the committee but rather on the community, where it belongs.

The sub-committee on private works set about the dual task of providing an inventory of the existing private structures within the community and of estimating the extent and character of post-war private residential and industrial construction. The lack of essential information soon led this sub-committee to start a land-use map of Chambersburg. With the help of the Borough Engineer's office this map has already proceeded far enough to indicate a series of more or less pressing land-use problems while illustrating the need for local building codes and zoning ordinances.

Local government officials have also participated in the work of the sub-committee on public service. This sub-committee was asked to survey existing public facilities and services and to translate the conclusions of other committee activities into their probable requirement for public works and services. With the active cooperation of public officials, this committee has made a significant inventory of existing facilities for public service and has determined the conditions under which such services can be altered or expanded.

When the vast fund of information accumulated by the subcommittees had been assembled and summarized, the question then arose as to what should be done with the findings. The facts clearly pointed to the need for local adjustments, such for example as certain changes in the High School's vocational curriculum, extension of some of the public services, the expansion of existing industries and the attraction of new industries, the erection of a community center, modification of the building code, and the enactment of a modern zoning ordinance.

What should be the Community Development Committee's role in such adjustment? After some discussion it was agreed to hew to the line set at the Committee's first meeting. Agencies already existed to push for and to enact reforms. Hence the Committee would remain a fact-finding agency. For, as the Committee put it, "upon all citizens and organizations of Chambersburg will fall the task of maintaining and improving the physical, cultural, and spiritual opportunities in the community. Post-war plans cannot be complete unless these tasks are assumed by all citizens."

Accordingly the record of facts, problems, and prospects was assembled in a series of reports and those reports were submitted to the proper local agencies. Conditions affecting the school curriculum were referred to the School Board. The factors bearing on the need for new industries were brought to the attention of the Chamber of Commerce. Borough, township and county officials were given pertinent findings of the public service committee, the private works committee, and the civic development committee. Local bankers were appraised of the newly-discovered facts in the farm credit situation. The service clubs were offered information concerning playgrounds and other civic improvements. The veterans' organizations and local employers were supplied with helpful data concerning the ultimate return of job-seeking soldiers.

Meanwhile, after seven months of industrious silence, the sub-committee on publicity began to inform the general public of the Committee's work and findings. Every public utterance of the Committee was a clear and specific statement of concrete facts of importance to the community. No crusades were preached. The public was given the facts unvarnished on the conviction that the average man and woman can be relied upon to react intelligently to a situation he or she understands.

A community meeting was held to which the public was not only invited but came. Each sub-committee chairman made a brief report summarizing the most important findings of his own group. At the end of that meeting it was made quite clear that community adjustment required community action, that no one could help the people of Chambersburg so well as they could help themselves by using the Committee's information to foster their own advantage. And the community accepted the challenge.

Today the Community Development Committee is Chambersburg's trusted source of information on local conditions because people there now know that the Committee seeks not to save the public but to help the public save itself. When new facts of sufficient importance are discovered, they are laid before the public either at an open meeting or in the newspaper. The action to be taken is left to the community to decide. And action is being taken! Public, semi-public and private agencies have all started work on their respective problems. The borough council has authorized plans for a filtration plant and has already completed plans for the extension of the light plant as soon as essential materials are available. The Borough Engineer's office is now at work on a permanent land-use map of the town that will bring into sharper focus the problems evident on the preliminary map.

The Superintendent of Schools has recommended to a receptive School Board certain adjustments in the vocational curriculum that will more effectively train young people for local industry and agriculture. The Committee's social and economic history of Chambersburg has been published and will be used in the High School to help local youth understand their really fine local heritage and opportunities. The Hospital Board has authorized a thorough study of the future needs of that institution in order that adjustments can be made as soon as possible. The American Legion and the Veterans of Foreign Wars have created the organization necessary to help returning soldiers adjust to civilian life. Every local manufacturer now has specific plans laid to expand employment at the end of the war. So have many business and professional people. And the local banks, having pledged themselves to support financially the legitimate post-war needs of the community, are now at work on the most effective procedure for so doing.

What has been done in Chambersburg can be done elsewhere. There are no more brains, energy and technical knowledge in that community than one can find in other cities and towns throughout the nation. Occasionally the Chambersburg group needed some technical help that was not available locally. But instead of quitting they hunted around until they found the help they needed. *And they always found what they were looking for.*

However, there should be no misunderstanding about such outside sources of help. From the beginning, the Chambersburg Community Development Committee has carried the ball, so to speak. The credit for what it has achieved goes truly to the local people who have worked with the Committee.

Whatever else it does, the record of Chambersburg offers eloquent proof of the advantages of community self-help. Here is evidence that where intelligent men and women get together to determine the facts about their own community, they lay the foundation for democratic action by creating an informed electorate. And by the same token, they avoid all of the waste, disappointment and confusion that follows in the wake of crusaders, publicity-seekers, and those who are simple-minded and lethargic enough to believe they can hire someone or elect someone to carry them comfortably into the promised land. What happens to the United States in the post-war years will be determined in large measure by the people themselves. It is to the honor of Chambersburg that it has demonstrated the practicability of a technique whereby we can plan our future with the help of reliable information. A greater or more needed public service is hard to imagine.

An Experiment in Regional Cooperation

In the southwest quarter of Mercer County, Pennsylvania, the Shenango River forms one of the most productive valleys of its size in the Commonwealth. Steel and its products have been the major output of the area although electrical machinery has run a close and significant second. Despite industrial uniformity, the people of this valley live in one or another of five politically distinct communities, no one of which is more than a few miles from all of the others. Largest is Sharon, with a population of about 26,000. Adjoining Sharon is Farrell with 14,000 inhabitants and clustered around these two cities are three small towns, Sharpsville, Wheatland and West Middlesex. As in so many other places, an area which is an enconomic unit grew up as political quintuplets. In the process the traditional frictions developed to make inter-community cooperation difficult. The people generally have been progressive and civic-minded but many of them have tended to think in terms of political rather than of economic boundaries.

Early in the war local problems of housing, transportation, and food supply led to the creation of a valley-wide War Problems Committee that functioned effectively for several years. However, the longer that Committee operated, the more it became apparent that certain industrial shifts produced by the war were very apt to modify the peace-time economic pattern of the region. It was also generally felt that some diversification of local industry would offer returning soldiers a wider range of job opportunities while easing the impact of any post-war recession that might occur. Accordingly each community began formally or informally to consider possible post-war planning programs.

Very shortly these groups discovered how hard it was to make independent adjustments in a closely interrelated area. Large plants located in one of the communities were providing employment for workers living in each of the five towns. A majority of the working population of another community was employed beyond the city limits. Within the corporate limits of the two largest cities very little room was left for effective industrial expansion. Yet numerous desirable plant sites were available for development in the surrounding boroughs. Clearly, what was needed was a valley-wide organization that could concern itself with the integrated problems of the entire region.

After some preliminary discussion the burgesses and mayors of the five communities appointed a Shenango Valley Development Committee and empowered it (1) to make an analysis of the post-war problems and prospects of the valley and (2) to suggest ways and means of assuring post-war prosperity for the region. The appointment of this committee was in itself a highly commendable act. Interborough competition within the valley has been traditionally keen. In substituting mutually helpful cooperation for long-standing rivalries, the five mayors not only displayed a high degree of intelligence; they proved that, under wise leadership, local government can and does put the public interest above human prejudice.

The personnel of the Shenango Valley Development Committee was chosen with equal intelligence. Care was taken to insure each community full representation on the Committee. But in selecting committee members the major concern was to recognize the various economic interests of the valley. As finally constituted the executive committee included a representative of (1) labor, (2) wholesale and retail trade, (3) finance and the professions, (4) industry, (5) agriculture, (6) civic development, and (7) local government. A director of research was also made a member of the executive committee. The five mayors and the chairmen of the two active civic post-war planning committees were members ex-officio.

One outstanding characteristic of this fifteen-man board is the fact that each member represents no one community but the entire valley. For instance, the labor member of the committee has his residence in Sharon but he represents all workers throughout the valley. The representative of wholesale and retail trade lives and conducts a business in Farrell, but he reflects the opinions and interests of all retailers of the region. The spokesman for agriculture is from West Middlesex but he serves all of the farmers within the valley. And so on throughout the entire personnel. By this device emphasis is put not on a community but on a problem. The intelligent solution of common problems thereby becomes the sole motivation of the group.

This does not mean that local interests and organizations are displaced by the regional group. Very early it was made quite clear that the Shenango Valley Development Committee existed to supplement, not to supplant, existing groups. The Post-war Planning Committees of both Sharon and Farrell remain intact and have sole responsibility for dealing with purely local problems. There has been no interference whatsoever with local government or with the powers and duties of existing service clubs, chambers of commerce, and other private groups. Rather the Shenango Valley Committee confines itself to those post-war problems common to the valley and requiring unified treatment. It is, in short, doing a vital job no one else and no other group is in a position to do.

There is another important delimitation of the Shenango Valley Committee's function. It is solely a fact-finding group. Its job is to define the post-war problems faced by the valley and to discover what practicable adjustments are possible. The information once assembled is handed to interested local groups for their consideration and action. Incidentally, this emphasis on fact-finding led to the selection of the research member of the executive board as chairman of the entire committee. Under his guidance the committee is providing local people with the information they need to help themselves.

Each member of the executive committee is in turn the head of an operating sub-committee charged with responsibility for assembling information of some one type. The personnel of the sub-committees is drawn from all parts of the valley and is representative of the various social and economic groups whose interests are in one way or another directly affected by the conditions each sub-committee is exploring. In this way the committee has the benefit of many points of view while, at the same time, it keeps the public informed of its activities and findings.

As in most other successful post-war councils, publicity released by the Shenango Valley Development Committee is absolutely devoid of ballyhoo. From time to time the Committee holds open meetings to which the entire valley is invited for the purpose of hearing newly discovered facts about the region and its prospects. These data are then reported in the newspapers in order to achieve maximum coverage. But all such releases stress fact and avoid fancy.

The extent of some of the research projects completed by the Shenango Valley Committee indicate the very real capacity of local groups for self-help. A preliminary survey of manpower and jobs showed a probable post-war surplus of workers. In order to help such workers find productive peace-time employment, labor and management got together, worked out a detailed questionnaire, and conducted a labor census of the valley's labor force of 10,000 men and women. By means of this questionnaire the constitution, experience and skills of local labor were clearly defined. With this information at hand, the committee and associated local groups were able to approach specific industries with facts *demonstrating* the industrial desirability of locating new plants within the valley. Moreover, in the process of conducting this labor census, both employer and employee got to know each other better and both were able to see more clearly the mutual character of their interests.

Regional Planning in a Great Industrial Center

The widespread industrial area surrounding the City of Pittsburgh is the most important center in America for the production of the ferrous metals and of many other types of primary materials which have been so vital to the nation's growth in years of peace, and so necessary to its success in war.

The very nature of the industries which have developed from the abundance of Pittsburgh's bituminous coal has forced their growth to follow the river channels. Problems of housing and transportation have been made far more acute and difficult by the rapid changes of contour caused by the deep channels cut by the State's western rivers through the plateau land of the Alleghenies. Congestion has tended to develop along river borders threaded by railroads and lined with steel mills whose workers have been housed on comparatively narrow strips of available low land or crowded back along the river hills.

The dominance of producer goods in the industrial pattern has led to drastic changes from periods of high prosperity, in years of expansion or war, to extreme dullness during downturns of the business cycle. The lack of an adequate backlog of consumer goods industries has made this area particularly vulnerable to the impact of depression.

In view of the problems which will face the Pittsburgh metropolitan area, in common with all American manufacturing communities at the close of the war, Dr. Robert E. Doherty, President of Carnegie Institute of Technology, brought together in 1943 a number of citizens from all walks of life to organize a cooperative attempt at formulating a program of growth and development which would insure the future of this area and improve its environment as a place in which to live, work, and play. These citizens organized themselves as the Citizens' Sponsoring Committee and established the Allegheny Conference on Community Development as a non-profit educational organization.

Subsequent development of the Conference clarified the aims and objects of the group and outlined a program of activity. It was decided that the Conference would study the problems of the various regions and industries and act in an advisory capacity with respect to other citizen groups and existing organizations, and that they would try to stimulate and encourage such groups to advance the position of the community by avoiding duplication of effort and by bringing about a correlation of programs, staffs, and resources.

All members of the Allegheny Conference participate as private citizens irrespective of their official or business capacities. The members, as civic minded citizens, are vitally interested in securing the greatest degree of efficiency and sound progress from public and private agencies of the region.

The scope of Conference plans involves elements that extend beyond the purview of most, if not all, of the existing individual agencies, and the Conference, therefore, will endeavor to guide the cooperative development of a comprehensive forward movement for the entire Allegheny region.

Reproduced with this summary is a copy of the organization chart of the Conference indicating the broad scope of its regional interests. All the committees are activated and at work on the problems indicated. Recommendations of the

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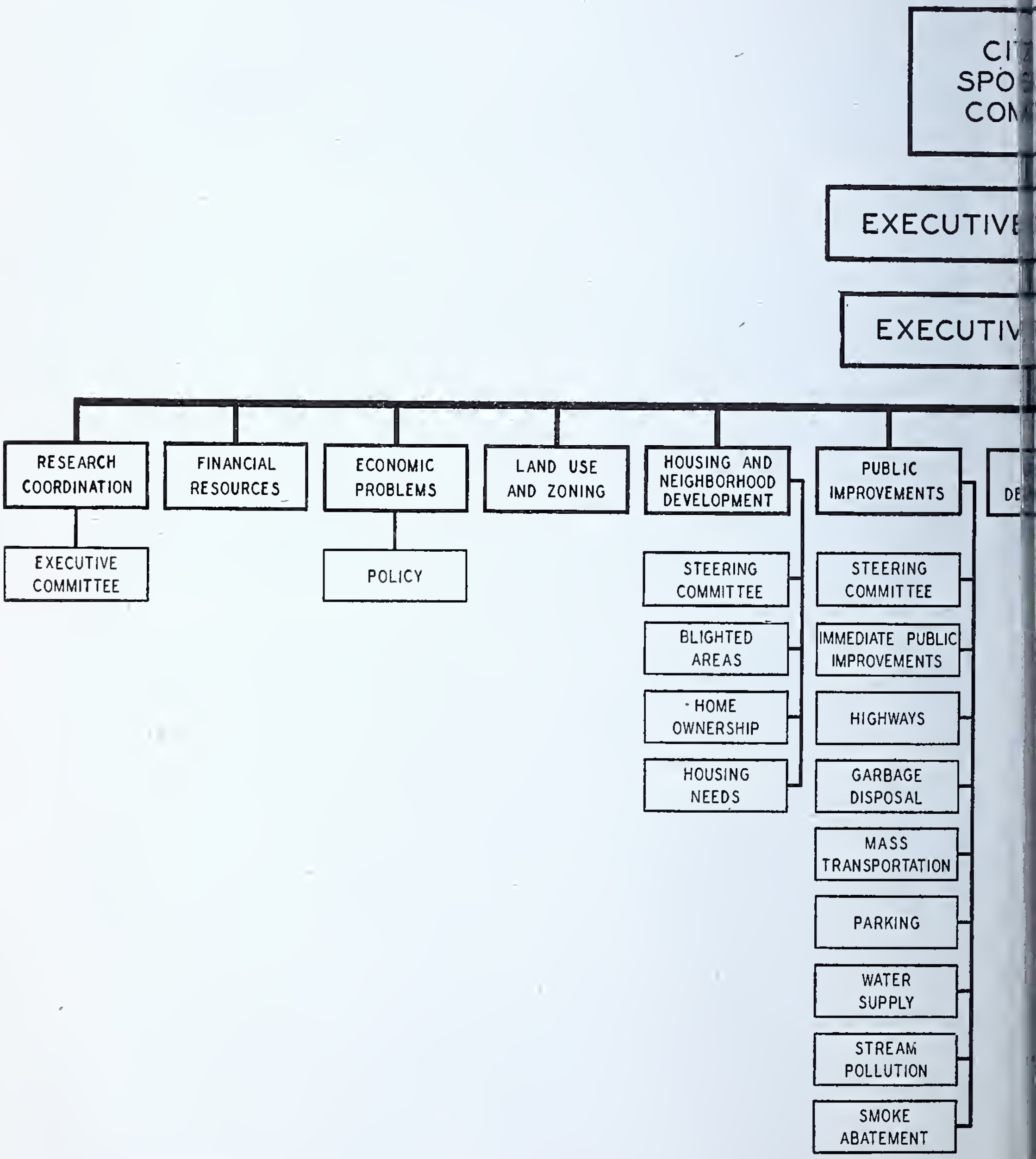

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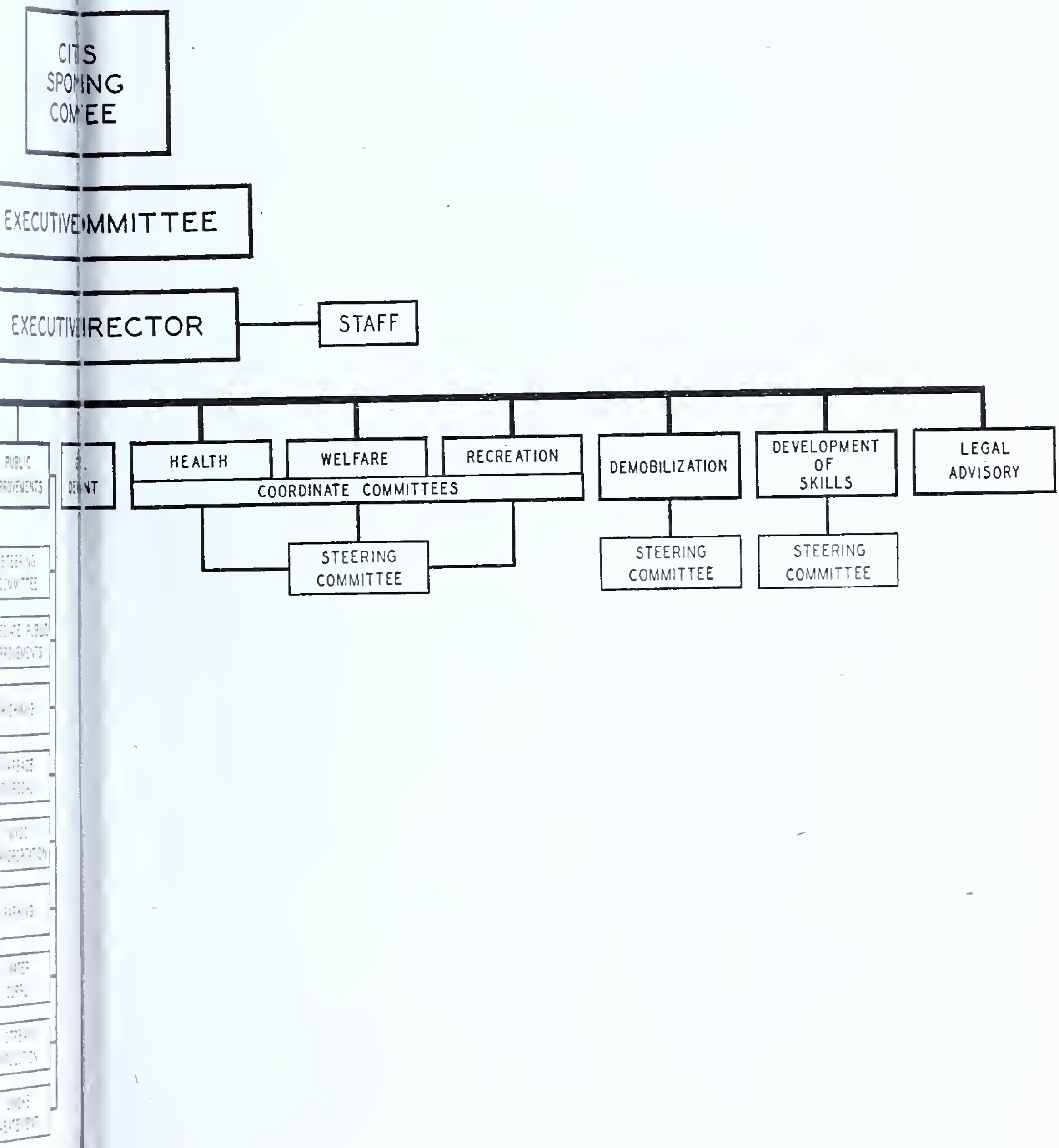

workers of the committees, when approved by the Executive Committee, are finally cleared through the Citizens' Sponsoring Committee. Thus the Citizens' Sponsoring Committee exercises final authority over the policies of the Conference.

Funds for the support of Conference activity are provided by individuals, industries, foundations, and corporations.

Every effort is made to utilize the services of existing agencies, public and private, whenever possible, in working towards a program of action.

The Conference plans are based on a three-year program for investigation of Allegheny region problems with recommendations for their solution.

Points Under Consideration by the Conference

The following points are under consideration in relation to the program of the Allegheny Conference:

(1) The construction cost of projects within the region and under consideration by various committees of the Conference for study and analysis are estimated to total from $300,000,000 to $500,000,000. There are, in addition, such intangible items as public health, cultural advantages, and economic benefits.

(2) Some projects taken up for study may be found to be financially unsound or not within the range of immediate accomplishment by either public or private agencies. General agreement to this will result in both conservation of civic energies and in financial economies.

(3) The program so far evolved by the Conference is one that cannot be undertaken by any civil subdivision. Some of the work is of a public nature and some of a private one. Some requires close public and private cooperation such, for example, as stream pollution elimination. The only way the entire program can be carried on is through an organization such as the Conference. This fact has been recognized in other metropolitan areas such as Louisville and Cincinnati where organizations similar to the Conference are also functioning.

A Great City Plans A Progressive Future

Unlike most old American communities, Philadelphia began with a city plan which was faithfully carried out in its early development. The Thomas Holm Plan, drawn in 1682 and adopted by William Penn, has given a permanent pattern to the older streets of the city, a pattern which has been modified only in very recent years. As the city outgrew its early boundary lines the force and effectiveness of that plan, designed as it was to meet traffic and living conditions of a horse-drawn age, did much to prevent the confusion of streets and avenues which has converted so many older cities into a labyrinth of no recognizable form.

From the date of the consolidation of the city's outlying districts in 1854, a certain measure of planning controlled the future development of the Philadelphia street pattern. Street widths and street layouts were subject to supervision by a Board of the Department of Surveys. The Fairmount Park System was extended, and public recreation arranged for under the Plans Division of the City Board of Surveyors. The first city Planning Commission was established in 1907, from which date, by gradual and sometimes halting steps the development of definite plans for the city's further growth has taken form, including such drastic and highly necessary improvements as the cutting of the Fairmount Parkway from City Hall to the Park's border, the development of the high-speed transportation system and of the city docks.

In 1929 Philadelphia established a second Planning Commission which was active only for a period of about four years. In 1933 the first effective zoning ordinance was approved by Council, but by 1940 the remarkable extension of the city's growth over so wide an area, the increasing intensity of the problems of transportation, which it shared with all other great American cities, the drift of population toward its extensive suburbs, and the pressure of those many economic and social problems which developed during the years of the great depression made necessary a new approach to the problems of the city's future growth and development.

In 1942 the City Council approved the appointment of a Planning Commission and appropriated adequate funds to engage a technical staff for working out solutions to some of the more acute conditions which had been developing over the course of many years. The most important product, to date, of the work of the City Planning Commission has been the publication of "A Recommended Program of Public Improvements, 1945-1950." This program, designed to be put into effect at the close of the war both as a stimulus to local employment and to fulfill immediate needs for better facilities and a more orderly pattern of growth, includes plans for sewage collection and disposal; for the rehabilitation of the city's water works; the improvement of the pattern of the main highway system; the removal of the "Chinese Wall" from Market Street west of City Hall; the extension of the Market Street Subway to 42nd Street; the further development of the city's docks to provide capacity for larger cargo ships; and the completion of the city's airports. These main projects cover only a portion of the recommendations made by the Planning Commission. Further need for public recreation facilities, for public buildings, for improved water supply and for refuse disposal is also considered, and various improvements recommended. A study was made of the city's financial position and of means for financing certain of these developments. Thought is also given toward projects for improving the city's housing facilities and to the construction of a tunnel under the Delaware River as a by-pass for traffic from Washington to New York City and from Pennsylvania to the New Jersey shore.

Studies are now in preparation to determine the probable future population, the labor force, and the housing needs in 1950, as well as the extent of the probable future growth to the close of the century, both for Philadelphia and for the eight-county area surrounding it. Methods are being developed on the basis of which detailed studies can be made as to housing conditions, population growth, and social and economic needs in all critical localities within the city. A coordination has been effected between all the agencies concerned in public recreation with the view of preparing comprehensive plans for all types of needed facilities in the whole city area.

Great cities, like small towns, and indeed every type of urban community in the United States, face a critical period. Decentralizing forces have been at work for more than a generation. The drift toward suburban communities and away from the traffic and congestion which have developed in so many urban neighborhoods compels a reappraisal of city needs and a reshaping of city facilities if the larger communities, which have contributed a major part of the commercial and industrial wealth of the nation, are to maintain their dominant position for residence and industry. Philadelphia has recognized that need, and has already taken important and progressive steps toward maintaining and improving its position as a city of homes, and as one of the greatest industrial and commercial centers of the western world.

The Scope of Local Planning

The range and diversity of the problems under consideration by community post-war planning committees within Pennsylvania can be seen in the sound job of analysis and adjustment now being done by the Post-war Planning Council of Lancaster.

Organized late in 1943 at the request of the Mayor, this Council includes representatives from every significant social, economic, or governmental group within the community. After several preliminary meetings, the Council concluded that some sixteen committees would be needed to give adequate consideration to the immediate and long-range opportunities that lie ahead of Lancaster.

Without attempting to list these committees in any order of importance, they are named below, with a brief description of the duties of each, to indicate the possible scope and importance of community self-adjustment:

1—**The Clearing House Committee.** Designed as a clearing house for suggestions received from the public, civic organizations, or governmental bodies. These suggestions are routed to the proper committees for study and action. Confusion and overlapping are thereby avoided and each proposal gets prompt and effective consideration.

2—**The Finance Committee** investigates the various possibilities of financing proposed post-war community adjustments. Only incidentally is it responsible for looking after the finances of the Lancaster Post-war Planning Council itself.

3—**The Letters-to-Service-Men Committee** has written to all local men and women in the armed forces. The letter carries a greeting from the community and asks whether the individual plans to return to Lancaster after the war; whether he (or she) wants his (or her) old job back; and whether he (or she) has learned any new trade that might be useful in the post-war years. The response to these letters has been extremely helpful in measuring the extent and skills of the probable peace-time labor supply.

4—**The Work-pile, or Re-employment, Committee** has compiled a list of post-war expenditures proposed for the repair, modernization, expansion or conversion of local business establishments of all sizes and types. These data are useful in measuring the peace-time volume of local employment.

5—**The New Manufacturing Establishments Committee** has been making intensive studies of manufacturing opportunities existing within Lancaster. Consideration is being given to the local natural resources, nearness to markets, human skills, existing enterprise, and the vast array of new materials and processes that have emerged during the war.

6—**The Expanded War-time Population Committee** has measured the extent and characteristics of the war-time movement of workers into Lancaster and has been working at the problem of fitting such people into the community's peace-time industrial pattern.

7—**The Distributive Trades Committee** is working to provide jobs for returning service men and war-workers by strengthening the local distributive trades. Surveys have been made to determine the present adequacy of such enterprises, and the results have been used to stimulate private adjustment of all local wholesale and retail trade.

8—**The Service Establishments Committee** is performing a similar function in an effort to strengthen Lancaster's service establishments. At the same time the Committee learns what new or expanded services are needed and how many jobs they will provide.

9—**The Expanding-Trading-Area Committee** is trying to determine what areas can feed business into the city for week-end shopping when gasoline rationing ends. It is believed that new sources of trade can be tapped without causing harm to the business interests of any other community by providing better and more accessible shopping facilities.

10—**The Farm Business Committee** is working closely with the Expanding-Trade-Area Committee because Committee members consider farming areas one of the most important sources from which trade can be drawn. Among other things this Committee plans to bring about closer relations between residents of the city and the rural sections.

11—While other committees are making Lancaster a good place in which to work, the **Committee on Recreational and Social Opportunities** is trying to make it a better place in which to live and to relax. One of the projects given special consideration was a community center in which clubs and organizations could meet and where the community can hold indoor sports events. Another important proposal of this Committee was a human rehabilitation project designed to prepare physically handicapped persons for self-sustaining employment. A Vocational Guidance Clinic was also conceived.

12—**The Committee on Civic Planning** has been getting public opinion as to needed public works so that Lancaster's post-war public works program could be of maximum service to the community. The range of the problems faced by this Committee embraced such diverse matters as zoning ordinances, the adequacy of police and fire protection, educational facilities, freight service, and city finances. The Committee's agenda finally became so crowded that its work was divided into four phases as follows:

13—**The Negro Housing Committee** is working at the problem of providing Lancaster's Negro population with modern, attractive, low-cost housing.

14—**The Roads Committee** has been analyzing local conditions and opinions affecting needed improvements in streets, sidewalks, street lighting, tributary roads, parks, shade trees, bus service, and grade crossings.

15—**The Airport Committee** is investigating ways and means of expanding local airport facilities and of improving post-war service for private and commercial planes.

16—**The City Plan Committee** has been considering proposals for modernizing the so-called Nolen Report, a formal plan for a greater Lancaster prepared in 1925. In general it is the function of this Committee to see that the physical layout, the governmental facilities, and the public services are adequate to meet the present and future needs of the city.

Other communities may find so extensive a program more than they care to sponsor all at once. There is certainly an argument in favor of the one-thing-at-a-time approach. But the program of the Lancaster Post-war Planning Council provides dramatic evidence of the extent, diversity and importance of the projects and problems now being considered by the more alert communities.

Whether they start with one project or many, the citizens of other Pennsylvania towns and cities interested in local post-war progress could learn much of value from Lancaster's attitude and program. By using what they have intelligently, and by doing the job themselves, they are laying the soundest possible foundation for their own future.

Achievements of a Typical Suburban Community

Lower Merion Township forms in effect a notch cut into the northwest side of the City of Philadelphia. The Schuylkill River runs along its northern border. The Township is traversed by the main line of the Pennsylvania Railroad, by the Schuylkill Branch of the Philadelphia and Reading, and by several heavily-traveled main highways leading out of Philadelphia to the west.

This Township, so closely integrated with the City of Philadelphia, has faced with remarkable success many of the more serious problems which have arisen in all American suburbs during the past twenty years. Its methods of dealing with these problems are notable in the history of Pennsylvania planning and deserve an important place in any survey of community self-development.

In 1920 this Township, which had been first settled in 1682 and had become a favorite residential district beyond the borders of the city began to experience the accelerated population growth and heavy traffic problems which developed in all American suburbs at the close of the First World War. Between 1910 and 1920 its population increased from 17,671 to 23,866 and following 1920 it was evident that this population growth was continuing, with the development of many new subdivisions and many scattered business districts, particularly along the main line of the Pennsylvania Railroad and along Lancaster Avenue. It was also obvious that if the population were to continue to grow at the rate established in the second decade of the century new provision for schools, sewers, and recreation facilities would shortly be necessary. If the favorable position which the Township enjoyed as a residential area were to be maintained both residence property and existing business establishments must be protected from haphazard developments which would be harmful to both. Industrial activity would have to be confined to areas in the Township where it would not destroy the value of business and residential property.

In view of these threats to the residential character of the Township a Zoning Commission was appointed in 1925. This Commission made an intensive two-year study of the problems involved and then recommended a zoning ordinance after holding a series of public meetings to fully inform the residents of the nature of the ordinance and the character of the restrictions proposed to be placed on the various portions of the Township. The Township Commissioners adopted the ordinance on March 16, 1927. Despite some primary opposition, the benefits of zoning to the community as a whole secured widespread public support and comparatively little difficulty was experienced in enforcing the regulations, since the necessity for the protection of all types of business, residential, and industrial property in the Township was obvious and urgent.

In 1934 the Lower Merion Township Planning Commission was established to deal with problems of automobile parking, highway congestion, and with the location of future public developments within the area. This Planning Commission published in April, 1937, *A Plan For Lower Merion Township* which is generally regarded as one of the best planning studies ever made by a comparatively small community. Estimates were made as to the future population growth, and traffic counts were made along all main highways as a basis for a plan of highway development designed to eliminate through traffic from purely residential neighborhoods, to develop relief routes for local traffic, to permit communication between local centers without entering into through traffic, and to concentrate through traffic on a relatively few routes.

A study was made of the business areas of the Township in order to determine the reasonable extent to which business could be expected to grow and in order to prevent encroachment of business enterprise into purely residential areas. A study was made of road widths in order to limit through traffic in certain areas and to accommodate the observed and expected traffic flow in others.

An extensive automobile parking survey was developed on the basis of a careful study of parking time in business areas. Recommendations were made for the provision of parking spaces as an integral part of the highway system and as an aid to the transaction of business in local marketing centers. In 1941, the general recommendations of the original plan were reinforced by a specific plan for municipally owned off-street parking spaces, financed largely by parking meter revenues. This recommendation, postponed by the war, is now receiving serious attention.

A plan for the development of park and recreational areas was carefully worked out to provide small neighborhood recreational facilities and larger recreation areas in various districts in the Township.

It was recommended that a section in the Township used for dumping purposes, to the detriment of nearby property values, should be made the site of an incinerator, properly parked and landscaped to improve the attractiveness of that portion of the Township.

The problem of land subdivision was carefully studied. Experience gained during this survey has been of aid to builders as well as to the citizens of the Township because of the attractive, convenient and economical nature of the developments which have been since completed.

Recommendations were also made as to changes in the zoning ordinance which at that time had been in operation for ten years. It had been discovered that the original ordinance had provided an excessive frontage for business to the detriment of both business and residential property in such areas. These and other amendments to the 1927 ordinance were embodied in a revised zoning ordinance adopted in 1939. Over one-half of the area of the Township was placed in a district with a minimum lot area requirement of 30,000 square feet. Because of the general support gained for the principle of zoning by the original ordinance, it was possible to extend certain restrictions which had proved valuable, and to require the provision of parking places for apartments and multiple dwellings.

The Planning Commission in 1939 submitted recommendations for the regulation of through trucking routes in the Township after a careful study of the hourly distribution of truck traffic on all its principal roads.

As a result of these activities, carried on at comparatively small cost to the residents of Lower Merion, the Township's advantages as a residential community have steadily grown throughout some of the most critical years of its history. Playground facilities have been increased from 18 acres to 95 acres. More adequate parking facilities have been provided to the benefit of local businessmen, property values have been stabilized and increased because of the security provided by the zoning ordinance, and Lower Merion Township has become nationally known as a pioneer in demonstrating the self-improvement and self-development possible by united community action in taking advantage of existing laws and existing powers of local government.

Perhaps the most outstanding reason for the success of the planning efforts of this community lay in the fact that the Planning Commission appointed by the Township Commissioners has been composed of citizens who were imbued with a strong belief in the necessity for the community adopting a program of local self-improvement and who appointed and maintained an able technical staff to assist them in their work.

A Pioneer in Cooperative Effort for Local Development

Williamsport's post-war planning program provides a notable example of efficient cooperation between several independently operating local groups.

Cooperative self-help is an old tradition in Williamsport. For several decades after the Civil War it was the chief lumber center of the United States. But about 1890 the nearby forests became virtually depleted and the community would undoubtedly have gone the way of scores of other lumber towns had it not been for one vital factor—local human ingenuity. In 1891 a Chamber of Commerce was organized to attract new enterprises and the entire community set about altering its economic way of life. Today Williamsport is one of the most prosperous industrial cities of Pennsylvania producing in peacetime such diverse products as motors, steel rails, cables, sole leather, furniture, broad silk, and paper boxes.

Among the present day groups working together for Williamsport's economic betterment are the Williamsport Community Trade Association, the Lycoming County Committee for Economic Development, and the Williamsport Community Progress Committee. These three organizations are natural complements. The first has in general concerned itself with the commercial phases of community adjustment; the second has been working primarily with industry; and the third is, among other things, interested in a program of public and semi-public works projects.

The Community Trade Association is well known for its excellent pre-war survey of community resources and needs, and for its long-range program for local economic rehabilitation. Without waiting for war's end, C.T.A. has been active since early 1944 preparing for the reconversion period. For example the downtown modernization committee has devised an extensive program for removing old business structures which have outlived their usefulness, renovating and repairing other structures along modern architectural lines, and freshening up the remaining properties with new coats of paint. During 1944 a total of $22,000 was spent on 18 repainting, 7 renovation, and 5 demolition projects. The program for 1945 involves 50 buildings in the downtown district and is the first phase of a progressive renovation program estimated to involve outlays in excess of $100,000 in the early post-war years.

Meanwhile the Committee for Economic Development, working independently but in close contact with C.T.A., has analyzed the local industrial pattern and estimated the degree of employment that will be maintained by existing industry. It has also been active in stimulating local industry to aggressive post-war expansion.

The Williamsport Community Progress Committee has over the past several years been developing plans and specifications for a 20 million dollar program of public and semi-public projects to be developed in the early post-war years. Using the data compiled by C.E.D. as a guide, these projects will be started at a rate designated to maintain present employment levels with priority given to specific projects in the order of their relative importance.

This program indicates not only the opportunities for local cooperation but the constructive results of mutual aid. It is one more example of what can be done when people use what they have and do the job themselves.

A Program of County Self-Protection

Crawford County is a well-balanced rural and industrial Pennsylvania county. In the last pre-war year 25 per cent of its employment was in agriculture, 21 per cent in the manufacture of talon fasteners, 17 per cent in retail trade, and 10 per cent in the manufacture of rayon thread. The county leads the nation in its output of hookless fasteners, is third in the State in the packaging of food and dairy products, and third in rayon production. Historically its industries are of world-wide importance since it was the site of the first oil refinery and the first pipe line in the world and the birth place of the natural gas industry.

Crawford County was also the first county in Pennsylvania to make use of air photographs as an aid to county government. These photographs were originally purchased by the County Commissioners for use in making a complete set of tax assessment maps of the entire county. In a recent issue of "Pennsylvania Planning," the chairman of the Crawford County Commissioners testified to the saving which has been effected by the use of air photographs in the revision of assessment maps and the location of untaxed property.

With the outbreak of war the citizens of the county faced an unanticipated problem when it was announced that the United States Army would construct within their borders an immense plant for the manufacture of trinitrotoluol. It was estimated that from 8,000 to 10,000 workers would be required on construction and that from 3,000 to 3,500 persons would be required to operate the plant. Almost immediately the County Commissioners recognized the fact that a county zoning ordinance was the only means by which adequate protection could be provided against congestion and over-crowding, and provision made for effective policing, fire protection, traffic control, and sanitation.

After consultation with the Executive Director of the State Planning Board, the County Commissioners appointed a five-man zoning commission which was later enlarged by the appointment of four additional members and made into a County Planning Commission with zoning powers. Under the direction of this Commission a zoning ordinance was drafted by a technical consultant, and field surveys were made by the county engineers. According to Mr. Reitze, Chairman of the County Commission:

> "Crawford County found the air photographs invaluable in the preparation of maps for the County Zoning Ordinance. The skeleton maps were traced directly from the air photographs. In making field surveys for the 'existing use' maps and the list of non-conforming uses, the air photographs were taken out into the field, and all the essential information marked on them and then traced on the proper map. This method made it unnecessary to take measurements in the field, or to spend any great amount of time in plotting in the office. The air photographs also made it possible to determine the location, nature and extent of the various classes of zones more scientifically and quicker and cheaper than could be done on the ground. It is hardly necessary to say that all our future planning and zoning will be based on air photographs. Our experience indicates that only by their use can the work be done properly and scientifically and at a feasible cost."

After several public hearings a zoning ordinance was finally enacted by the County Commissioners on May 27, 1942. The area zoned does not cover the entire county. It comprises a section 18 miles long and 12 miles wide, including all that part of the county within five or six miles of the outer limits of the ordnance works.

While many of the dangers and problems which had been anticipated in Crawford County failed to develop, a large measure of the credit for that fact must be assigned to the foresight of the County Commissioners in adopting a plan of action which enabled them to prevent troubles which have seriously affected so many war-industry communities within the past three years. That the same device is available in all parts of the Commonwealth in dealing with the many problems which confront us in the post-war era has made this pioneer experience in county self-protection through planning and zoning an important milestone in the history of local government.

> "There can be no question," writes Karl A. Miller, the Crawford County Engineer and Zoning Officer, "that the Crawford County zoning ordinance accomplished its purpose before it was enacted. The knowledge that a zoning ordinance was in the making served as a deterrent to those who might have been inclined to disregard the rights of others and the public and, incidentially to create detrimental and unwholesome conditions seen in other places where there is no adequate regulation. It is a fact that certain businesses of a camp-follower or hanger-on nature, or which would definitely be barred or restricted by the ordinance, made no effort to set up shop in the county. On the whole, the infiltration proceeded in a rather orderly manner and no serious complications or detrimental situations were created, a large share of the credit for which should be given to the zoning ordinance in the making.
>
> The officers in charge of the Keystone Ordnance Works took the position, based on their experience in similar projects, that any action which was contrary to the intent of the zoning ordinance, would be considered as detrimental to the war effort. The zoning authorities are glad that this position is so well understood that to date it has not been necessary to call on the Ordnance Depart-

> ment for assistance in safeguarding the sanitary and healthful living conditions of its employees."
>
> Mr. Miller also states that, "during the first six months of the zoning ordinance no complaints or appeals were filed with the Board of Adjustment." He concludes his statement with the following words:
>
> "After the present war is over Crawford County will be required to decide whether (1) to terminate the zoning ordinance, or (2) to continue it as is, or (3) to enlarge its scope so as to include all the county.
>
> "This writer believes that the third named above is the proper course to follow. He believes that after the war there will be widespread building activity and development, which will repeat the mistakes of the past if allowed to grow up wild. The time to plan and zone is before the necessity arises, and if we wait too long, the harm cannot be undone. What is true for Crawford County applies to every other county in the State. Future generations will thank us if we enact zoning ordinances before the big spree comes after the present war is over, and they will censure us if we permit uncontrolled and unregulated construction and development to cause additional blights for our successors to worry about and find a cure for."

The Planning and Zoning Enabling Acts of the Commonwealth have proved effective wherever they have been intelligently and energetically applied. In recent years it has always been possible in Pennsylvania for local authorities, through the exercise of their powers under the planning and zoning laws of the Commonwealth and through the establishment of programs for local self-improvement, to reduce the need for the exercise of Federal or State authority to an absolute minimum. It is to be hoped that in the post-war years we may experience such a revival of local responsibility and local initiative that the trend towards centralization of government, which has proved so destructive to the nations of Europe will be effectively checked on American soil.

—AND MANY OTHERS

It is obviously not possible in a booklet of this size to do justice to all of the community planning efforts now being carried on in all parts of the Commonwealth.

Among many others worthy of mention are such programs as that sponsored by the Citizens Council on City Planning in Philadelphia. The Council has stimulated official action on city planning and now, in cooperation with the Philadelphia Chamber of Commerce and the Board of Trade is initiating An Exhibition of City Planning at an estimated cost of $200,000.

The purpose of the Exhibition is to develop public interest, understanding, and support for constructive planning in Philadelphia and particularly for the work of the City Planning Commission. It will include displays on Traffic, Airports, Transportation, Housing, Water Supply, Sewage Disposal, Recreation, and Education.

Another interesting example of community action is the program sponsored by the Service Clubs of Kennett Square with the objective of remodeling all of the building fronts in the commercial area of the borough in line with the colonial tradition of which the community is justly proud. Local banking interests are supporting the program through the granting of loans at unusually low rates of interest and with favorable amortization terms.

The planning programs in the cities of Allentown and Lebanon have been greatly strengthened. Adequate financial support for the Commissions making possible the employment of competent planning and zoning technicians has resulted in the preparation of city plans, the development of zoning ordinances and the completion of public works programs which will greatly strengthen the position of these communities in the post-war period. These and many other developments are significant of a wide-spread appreciation throughout the State of the pressing need for intelligent and informed action to meet whatever may develop in the years which lie immediately ahead.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols., 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

*14—Industrial Utility of Water. Part 1. Temperature and Chemical Content at Low Flow. June, 1945.

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.

*Post Defense Problems, April-June, 1941.

*Community Self-Appraisal (Revised Edition), April, 1942.

*Comparative County Data, May, 1942.

*Planning and Zoning Progress in Pennsylvania, July, 1942.

*Population, October, 1942.

*Handicrafts in Post-War Planning, May, 1943.

*Plastics, July, 1943.

*Air Photographs, February, 1944.

*Light Metals and Stainless Steels, August, 1944.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

NSYLVANIA PLANNING

Pennsylvania State Library
DOCUMENTS SECTION

CONSERVATION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

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AUGUST 1945

COMMONWEALTH OF PENNSYLVANIA

Edward Martin, Governor

PENNSYLVANIA DEPARTMENT OF COMMERCE

Floyd Chalfant, Secretary
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Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

Vol. 9 AUGUST, 1945 No. 6

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A CONSERVATION PROGRAM FOR PENNSYLVANIA

1. *A unified and orderly program for the conservation and wise use of the resources of Pennsylvania can provide substantial postwar employment.*
2. *Such a program can effect economies in annual costs to State and local government and to industry.*
3. *On a long-term basis, an effective conservation program is self-liquidating.*
4. *It will insure the future of our vital raw materials—water, wood, oil, coal and soil.*

Our State's Program in Conservation

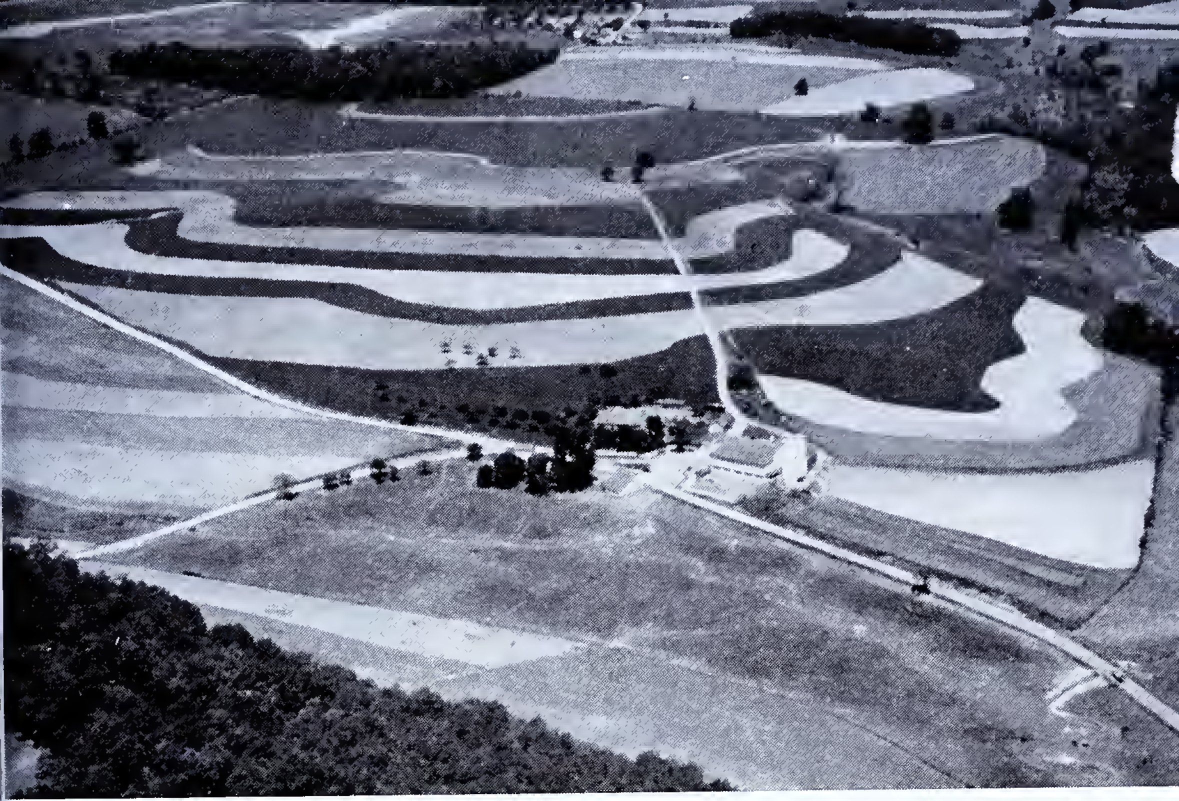
For the first hundred and fifty years of American history a foremost problem of the people of Pennsylvania was that of subduing the twenty-nine million acres of forest land which covered almost the whole surface of the State. Here was a land which had grown wild through millions of years of geologic history. To create farms in these forests and to clear the streams of the immense tangle of floating brush and trees was a gigantic labor. Soil enriched by the leaf mold of untold generations of forest trees yielded what seemed to the early settlers prodigious and unprecedented crops of corn and tobacco. It was natural, in opening up this new Promised Land, that no thought should be taken as to the consequences of disturbing an age-old balance of nature which provided such rich reward to the pioneers.

One fact immediately clear to the early European settlers of our land was a difference of climate between America and Europe. Here the extremes of heat and cold, of rainfall and dry weather, are greater than those of Western Europe. Sudden and torrential summer storms are far more frequent and Indian corn, the favored food crop of early settlers, demanded a more open type of cultivation with much more bare soil left to the mercy of the weather than had been common in the pasture lands, or the oat, rye and barley fields of Germany or Great Britain.

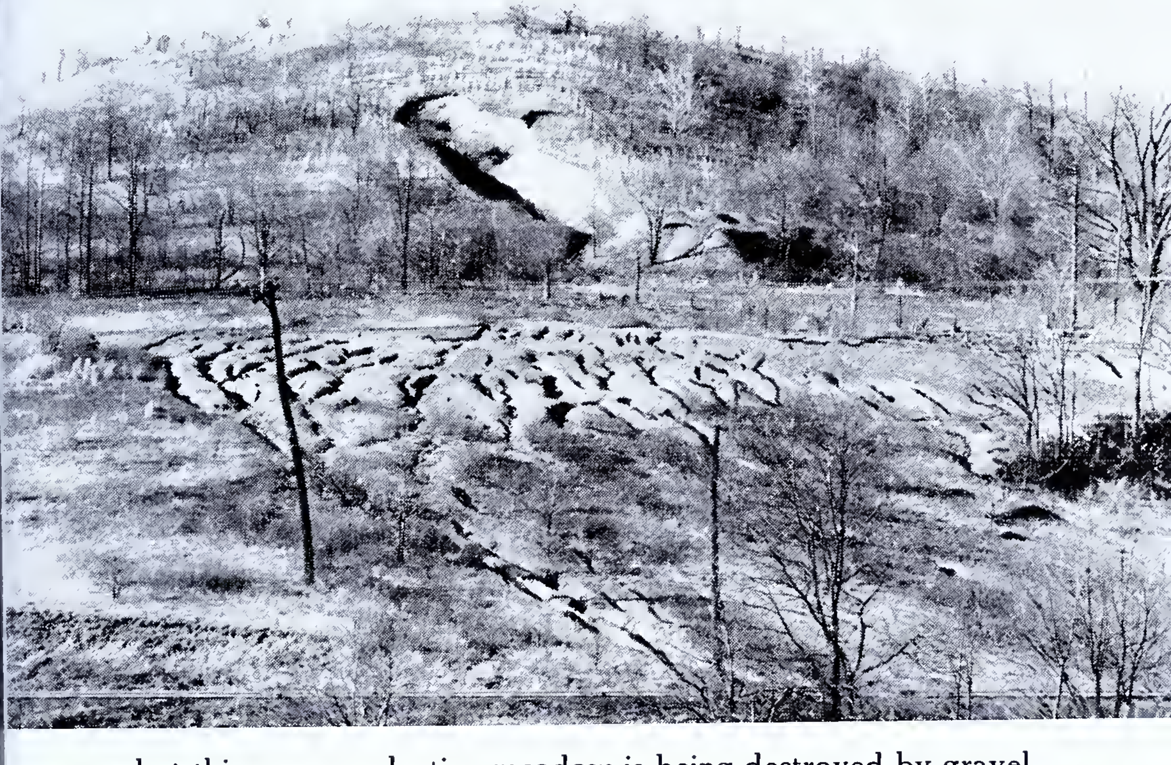
At first these facts seemed of little moment, but after a generation of active cultivation it became clear that many things were occurring in western agriculture which were strange to old-world traditions. Heavy rainfalls cut deep gullies across plowed fields. The thin topsoil of deforested hillsides washed down into the bottom lands. Over bare slopes, denuded of their ancient forests, the spring rains poured down to the rivers in a yellow flood. Rivers were silting deep with the topsoil of once rich farms and in many areas there developed a deficiency of ground water to supply the wells in dry seasons, or to maintain the deep moisture which carried field crops through hot summers. The prodigal cutting down of forest trees with no thought of replacement brought ruin to many famous lumber towns which had supplied the beams and siding for the houses and factories of an expanding America, the ties for its new railroads, and the props for its coal mines.

At the beginning of the 20th Century it became clear that even the vast mineral wealth of such a state as Pennsylvania was not inexhaustible. Mining reached to deeper levels, the infiltration of surface water from open mine shafts and abandoned workings caused serious problems in the production of anthracite. The accumulation of enormous hills of culm and slag in the neighborhoods of mining towns and steel mills did far more than to deface the surface of the land and render useless for agriculture considerable tracts of country. Washings from these vast accumulations of the labor of a hundred years polluted our rivers with mineral salts fatal to fish and wild life and added further to the problems of silting in the beds of rivers and reservoirs.

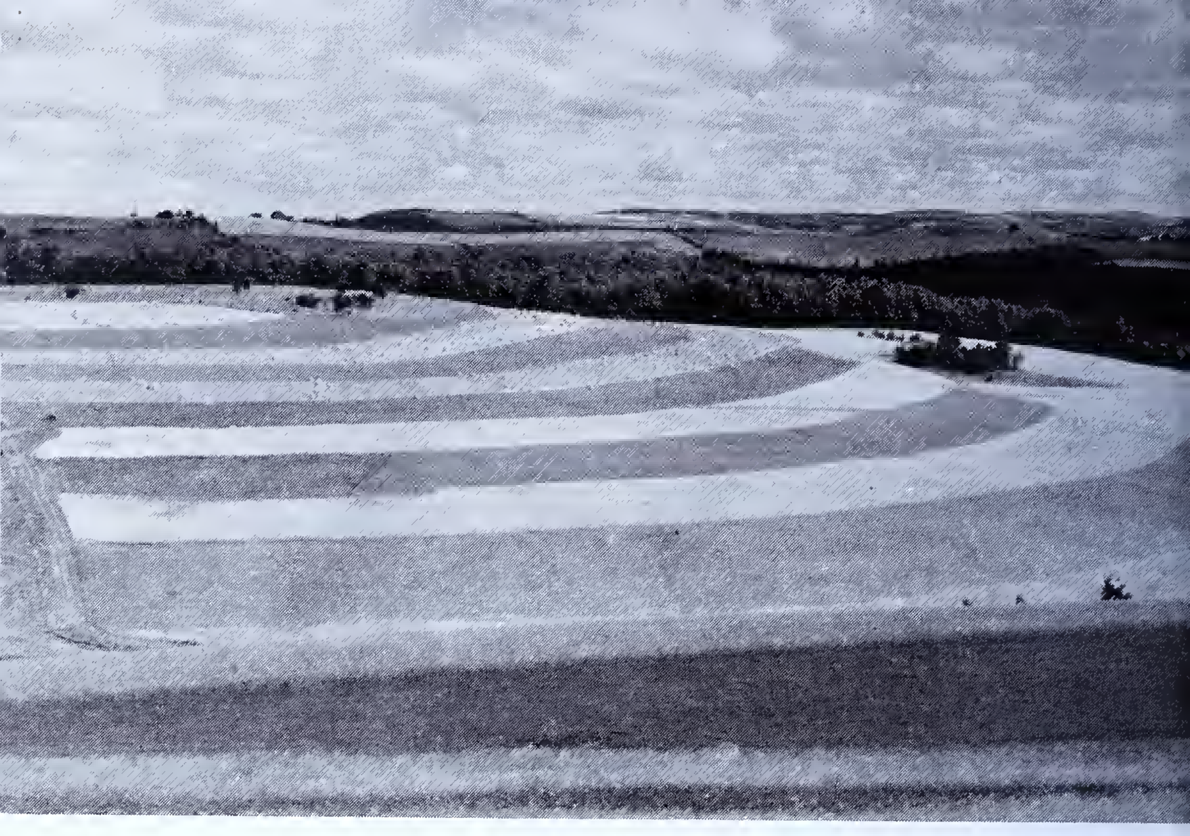
The maintenance of adequate water supply for great cities below the site of large mining or industrial operations became more and more difficult. Pennsylvania, which led the Nation in the production of its lumber in 1860 and was third in the Nation as late as 1889, rapidly declined to twenty-fourth place



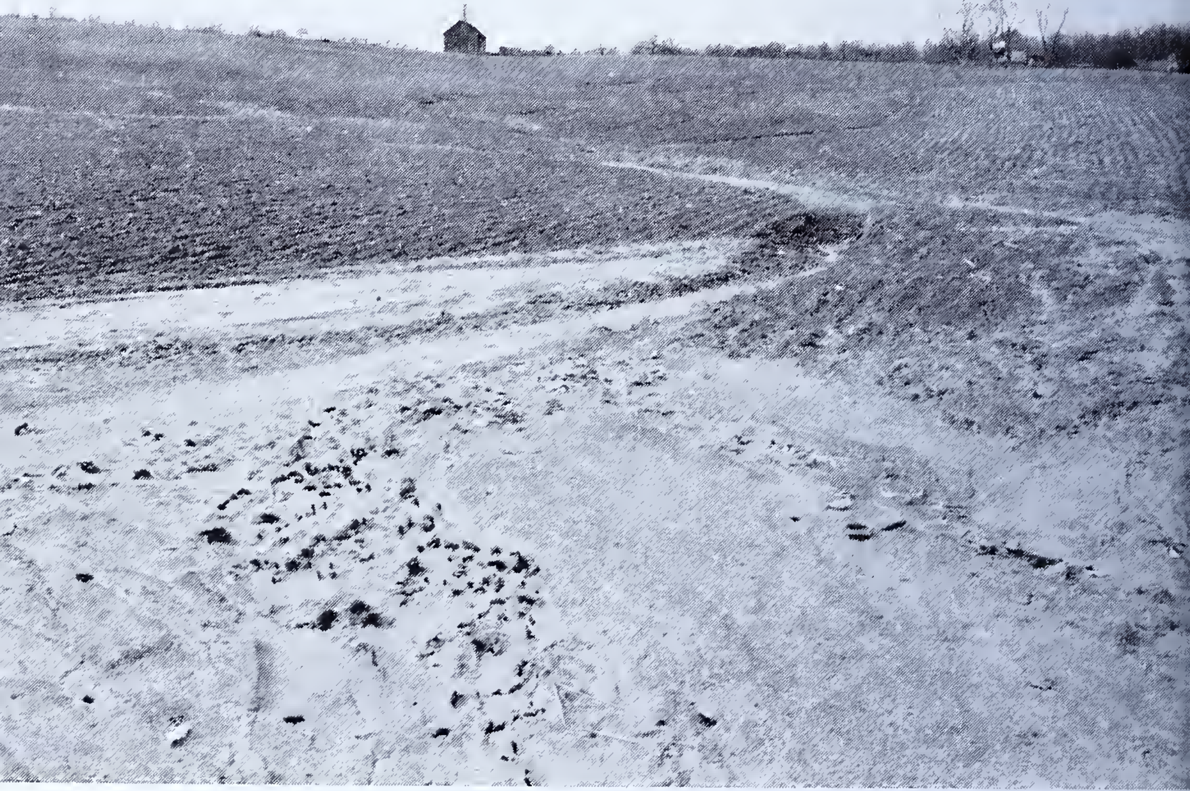
Contour plowing keeps top soil on the hillsides—



but this once productive meadow is being destroyed by gravel washed from a hillside gully.



Strip cropping protects this rolling farm land—



but this gently sloping field is being destroyed by erosion and silt deposits.

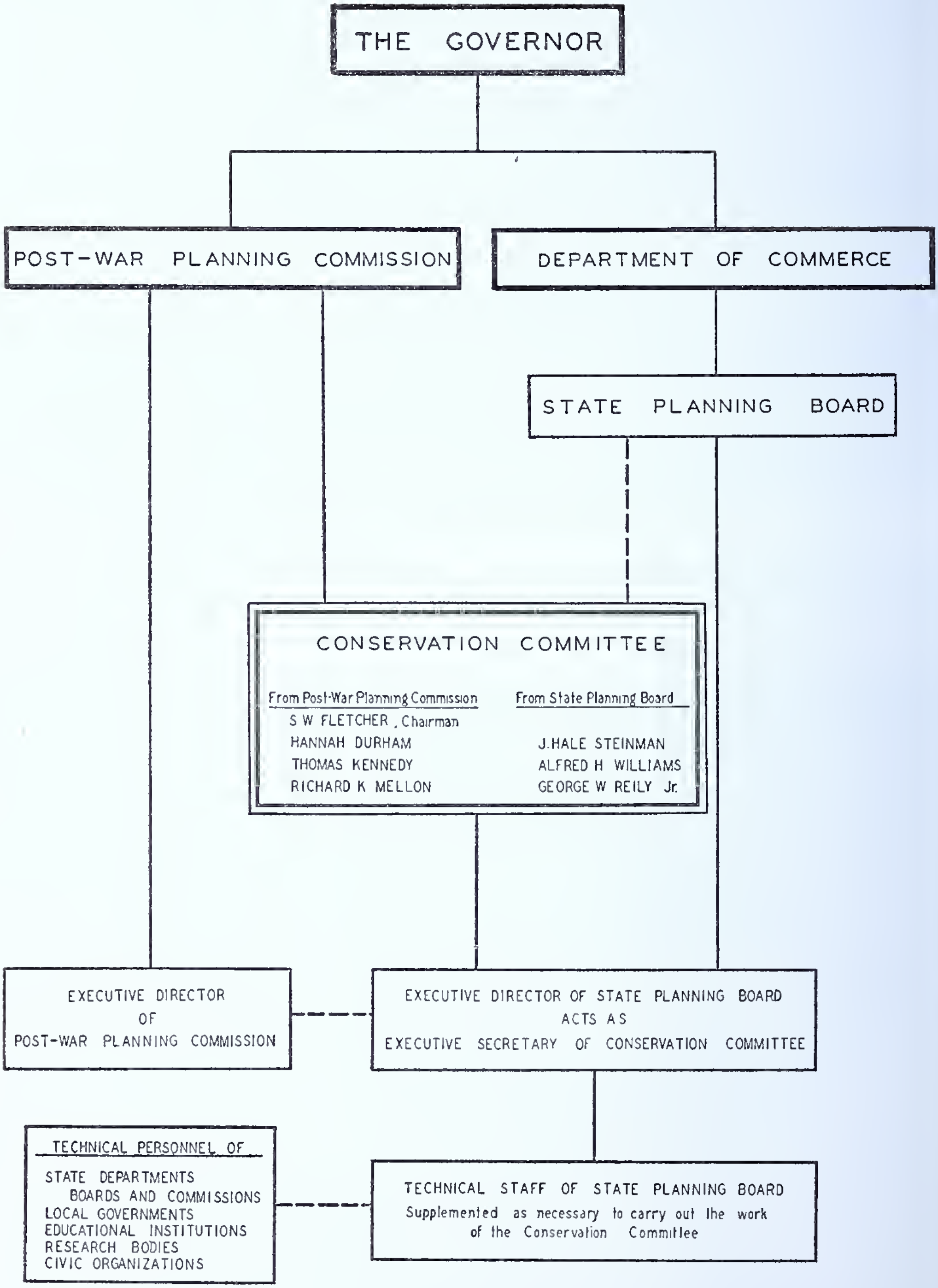
in its output of merchantable lumber, although more than half of its area is still classed as "forest land." Strip mining, cutting long raw gashes across the landscape of shallow coal measures, left behind deep gullies and ridges of raw earth which added to the silting of the streams.

Finally the great demands of production made on American industry by the First and Second World Wars has emphasized the gravity of all these conditions and has led to a general realization of the fact that conservation of all the natural resources of our State is a vital necessity to the future prosperity of this Commonwealth.

The gradual acquisition by our State Government of 2,500,000 acres of forest and game land and the adoption of many laws for the protection of soil, forest and mineral resources and water supply has marked a continuous program over the past thirty years. The 1945 Session of the General Assembly will take a high place in legislative history for its notable contribution to the cause of conservation under the leadership of Governor Edward Martin.

A comprehensive program for the conservation of the State's resources was enacted into law. Appropriations to the State Department of Highways, Forests and Waters, Health and various other agencies, the ratification of the Ohio River Valley Water Sanitation Compact, amendments adopted to the Pure Stream Law, to the mining laws and the soil conservation laws, have paved the way for a more intensive activity in the conservation in all the State's human and natural resources than was ever possible before.

Recommendations of the State Planning Board, made over a period of years, had finally been carried into effect and through the joint action of the State Planning Board and the Post-War Planning Commission there has been developed a State Con-


THE GOVERNOR
POST-WAR PLANNING COMMISSION
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
CONSERVATION COMMITTEE
From Post-War Planning Commission
S W FLETCHER , Chairman
HANNAH DURHAM
THOMAS KENNEDY
RICHARD K MELLON
From State Planning Board
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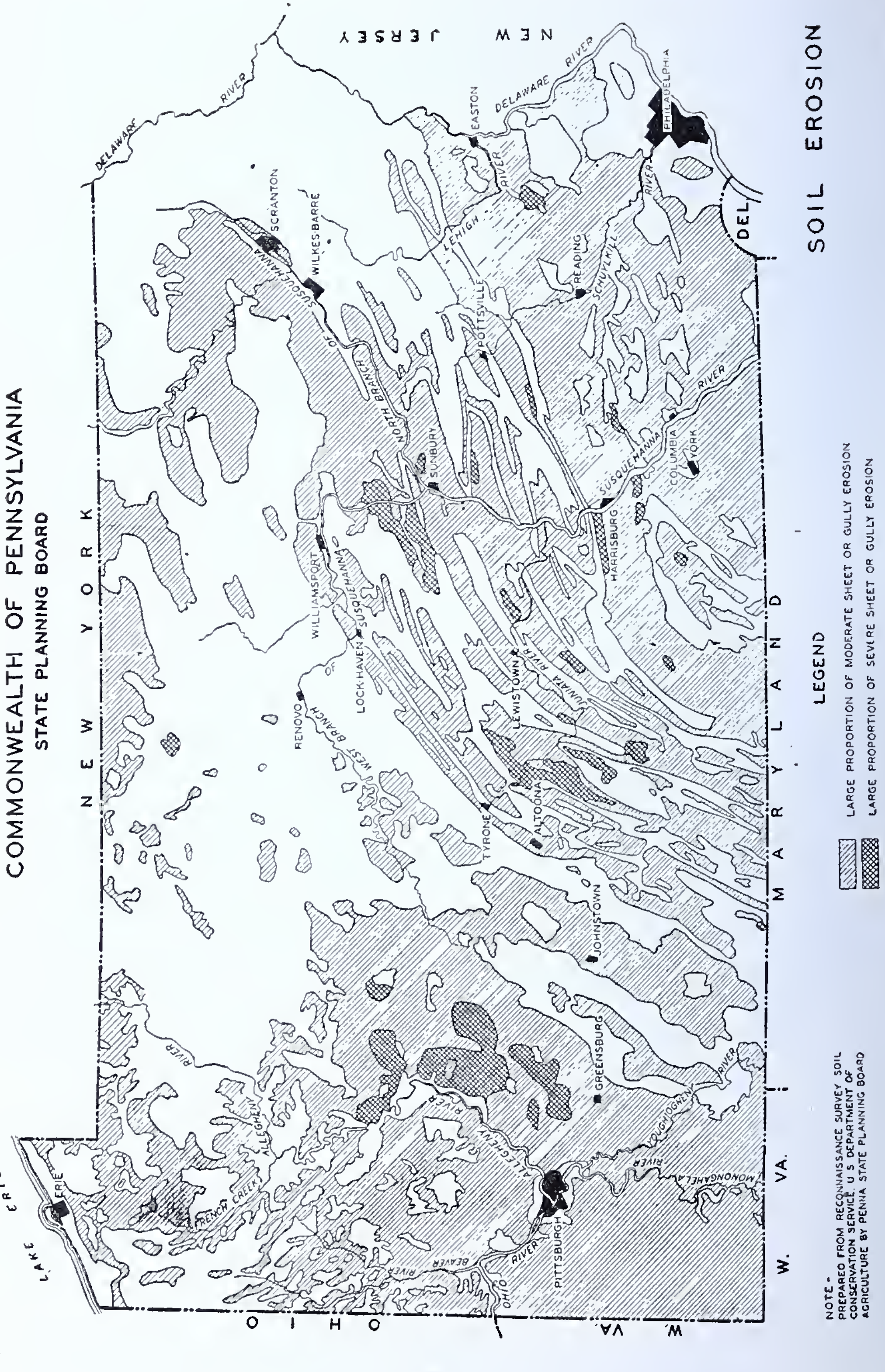
ALFRED H WILLIAMS
GEORGE W REILY Jr.
EXECUTIVE DIRECTOR OF POST-WAR PLANNING COMMISSION
EXECUTIVE DIRECTOR OF STATE PLANNING BOARD ACTS AS EXECUTIVE SECRETARY OF CONSERVATION COMMITTEE
TECHNICAL PERSONNEL OF
STATE DEPARTMENTS
BOARDS AND COMMISSIONS
LOCAL GOVERNMENTS
EDUCATIONAL INSTITUTIONS
RESEARCH BODIES
CIVIC ORGANIZATIONS
TECHNICAL STAFF OF STATE PLANNING BOARD
Supplemented as necessary to carry out the work of the Conservation Committee

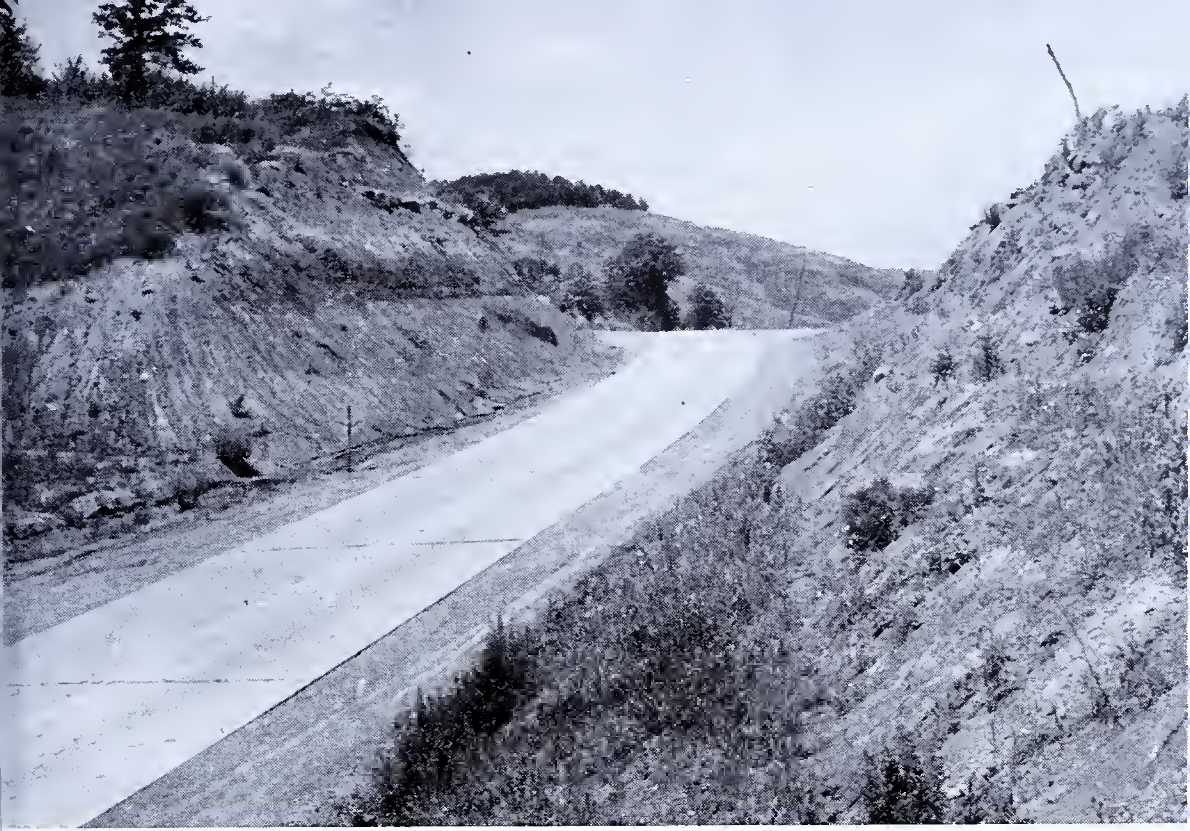
servation Committee composed of four members of the Post-War Planning Commission and three civilian members of the State Planning Board whose functions it will be to coordinate the conservation activities of all agencies within the Commonwealth. This Conservation Committee will consist of Dean S. W. Fletcher, Chairman, Colonel Richard K. Mellon, Mrs. Hannah M. Durham and Thomas Kennedy from the Post-War Planning Commission, and Dr. Alfred H. Williams, Colonel J. Hale Steinman and George W. Reily, Jr., of the State Planning Board. Francis A. Pitkin will serve as Executive Secretary to the Committee and will direct the staff work on the Committee's program.

Because of the wide public interest in the many problems which fall within the field of conservation in Pennsylvania, the State Planning Board is reprinting as an issue of "Pennsylvania Planning" a revised edition of its summary of the State's conservation needs and its recommendations for legislative and other action which was presented to the Governor in January 1944 and formally transmitted to the Governor and members of the General Assembly in March 1945.

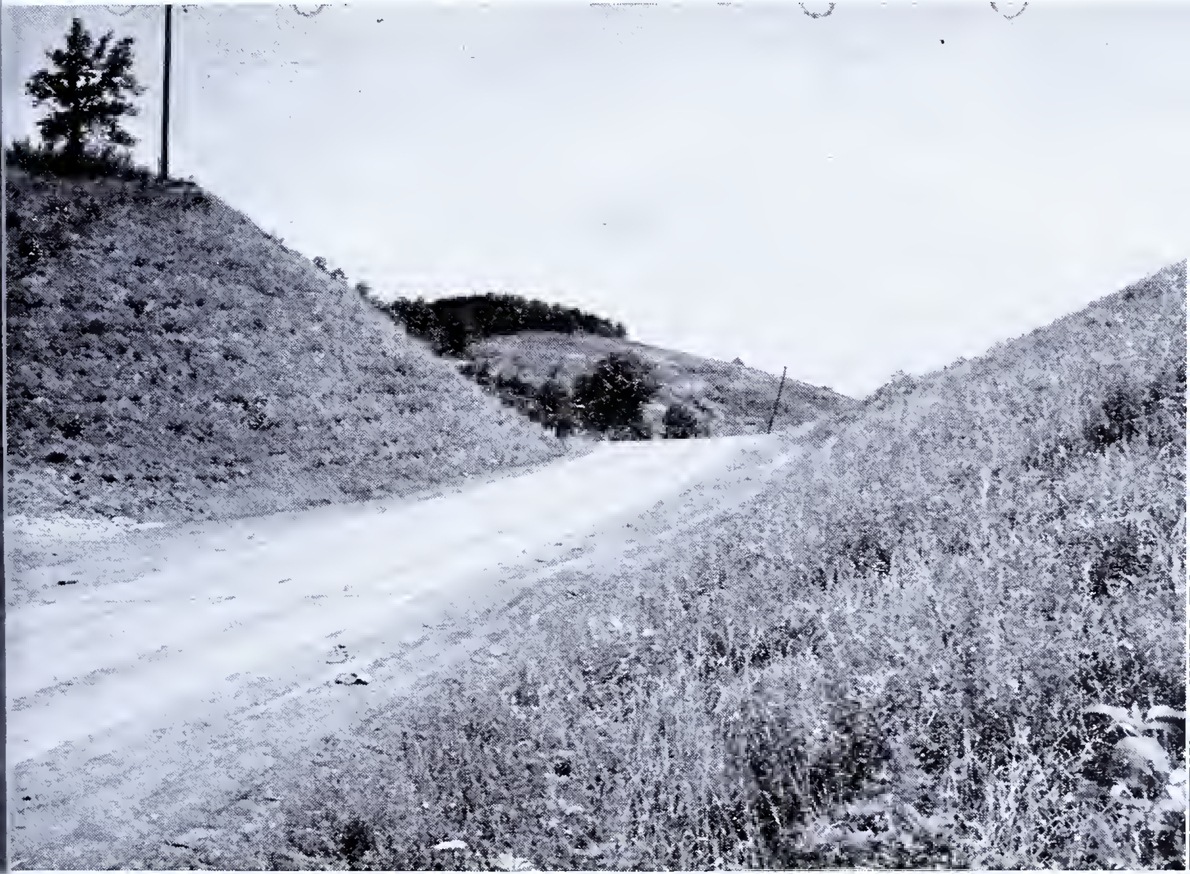

COMMONWEALTH OF PENNSYLVANIA
STATE PLANNING BOARD

SOIL EROSION

NOTE -
PREPARED FROM RECONNAISSANCE SURVEY SOIL CONSERVATION SERVICE U.S. DEPARTMENT OF AGRICULTURE BY PENNA STATE PLANNING BOARD



Raw highway cuts are dangerous, ugly and costly to maintain—



but they can be graded and planted to prevent erosion.

Thousands of dollars are spent in clearing away soil washed upon the highways after each heavy rain.

Here, drainage from the highway has damaged a particularly valuable piece of farm land.

Basic Conservation Problems Affecting the Economy and Well-Being of the Commonwealth

CONSERVATION OF THE SOIL

Extent of Soil Erosion

Forty-nine per cent of the non urban land in Pennsylvania has lost between one-fourth to three-fourths of its topsoil (1).

One and one-half per cent has lost more than **three-fourths** of the topsoil—in some cases all of the topsoil and some subsoil (1).

The most severe erosion in general is in the narrow cultivated valleys of central and south-central Pennsylvania.

"Moderate" erosion, representing 25 to 75 per cent loss in topsoil, is widespread in southwestern Pennsylvania, as well as in the valleys of the central and south-central area.

Although not as consistently widespread as in the southwest, it is also apparent in southeast Pennsylvania.

Little or no erosion is found only in forested areas in the north-central and northeastern counties (1).

Soil Erosion Affects Industry, Agriculture and Full Employment

Full employment will be possible only if farms continue to produce at full capacity to provide the needs of our growing industrial population and markets for their products.

---

(1) See page 51 for all Reference Notes.

Agriculture provides the chief source of employment in thirty-three Pennsylvania counties and the second most important source in nine other counties. The continuing prosperity of the State's agriculture is vital to the welfare of its manufacturing industries and its commerce.

The productivity of the State's farm land is a vital factor in reducing the cost of food supplies for our industrial cities. Pennsylvania farms are important markets for Pennsylvania manufacturers. The interests of both groups are closely interdependent.

Agricultural products are providing more and more of the raw materials for manufacture. This is true in food packing industries and in many types of chemical industries dependent on farm and forest products for their basic materials. Such relationships between manufacturing plants and the farms surrounding industrial areas are providing more and more opportunity for economy of operation to both farms and manufacturers.

Maximum productivity of the land is essential to economy in production of agricultural products and to the ultimate lowering of living costs.

Without conservation of the topsoil essential to plant growth, high productivity cannot be maintained.

Conservation of topsoil in Pennsylvania is essential for lower costs and fair returns to the farmer. It is essential for lower living costs for industrial workers and for lower production costs.

Conservation of topsoil is also essential for continued employment in agriculture and for a balanced economy which will improve the competitive position of Pennsylvania's industry.

Soil Erosion Affects Income and Tax Base

The farmer loses. The business man loses. The government loses. Everybody loses. Living standards go down and the cost of government goes up for us all.

Soil Erosion Increases Flood and Drought Hazards

Soil lacking in organic matter is unable to absorb and hold water as effectively as soil containing this important material.

As a result the major portion of the rain water escapes rapidly into nearby streams thus encouraging flood and drought conditions.

Blocking of stream channels and filling of reservoirs with sedimentation from eroded areas adds to the flood hazard.

Plants growing on eroded soils are more likely to suffer from lack of water during periods of deficient rainfall through absorption deficiency.

Soil Erosion Affects Reservoir Storage

The effects of soil erosion upon reservoirs for public and private water supply, power development and recreation are apparent in the depletion of storage volume. In a number of reservoirs scattered throughout the Nation this depletion ranges from .10% per year to as high as 5.96% per year. The average amounts to an annual depletion of 1.44% per year. (2)

> One reservoir in Pennsylvania—Palington Reservoir in York County—is estimated to have a loss of storage of over three per cent per year. Although not applicable to all areas of Pennsylvania, this is indicative of the problem and its potential cost for dredging or for replacement of reservoir facilities. (2)
> The twenty acre reservoir in Ridley Creek, Delaware County, was dug seven feet deep in 1936. In 1940 that reservoir, by actual survey, was three and one-

> half feet deep. It silted fifty per cent in four years or twelve and one-half per cent a year. (3)
> Engineers of the Philadelphia Water Bureau recently were compelled to remove some 420,000 cubic yards of mud from the sedimentation basin of the Torresdale pumping station.

There are 800 major reservoirs in Pennsylvania representing an investment of over $350,000,000. (2)

Only through soil conservation practices will it be possible to check the threat of early obsolescence of existing and future investments in reservoirs or to eliminate high maintenance costs.

Soil Erosion Affects Streams and Harbors

Silt amounting to 25 to 30 million tons has accumulated in the Schuylkill River during the past 140 years. At present $400,000 a year is being spent by the Federal government upon maintenance of channel dredging in the navigable section of the Schuylkill River below Fairmount Dam in Philadelphia. Capitalized at four per cent interest, this is equivalent to $10,000,000. During the seven years between 1931 and 1937 inclusive the Federal government and the City of Philadelphia were required to dredge approximately 12,000,000 tons from this section of the river. Pennsylvania's share in financing recommended improvements and dredging is estimated to be about $9,000,000. (4)

> Although much of this silt is attributable to deposits of culm from the hard coal regions, almost half consists of **soil** which is the major factor in preventing the profitable use of the culm deposits.

In the Ohio River Basin, though detailed figures are not available, soil erosion is far more severe than on the Schuylkill or Delaware.

Any investment in dredging is obviously of only temporary value unless soil erosion is checked.

The fine coal being dredged from this river was wasted by some upstream coal mine.

The mud silting this reservoir was the top soil of Pennsylvania farms.

Uncontrolled runoff in the headwaters means floods down stream—

causing loss of possessions and property damage amounting to millions of dollars yearly.

CONSERVATION OF WATER RESOURCES

Floods and Droughts

Flood damage in Pennsylvania in 1936 was over $212,000,000, 80 lives were lost and 2,822 persons were injured. (5)

Flood damage in May 1942 along the Delaware and Lackawanna Rivers was $15,000,000. 33 lives were lost. (6)

Flood damage in July of the same year in the northwestern part of the State is estimated at over $10,000,000. (7)

Flood damage costs to the Pennsylvania Department of Highways alone amounted to $8,772,362 for the eight years between 1935 and 1943. This represents an annual governmental cost for one State department of over $1,000,000 a year attributable to floods. (8)

This annual drain upon the total income of Pennsylvania contributes toward higher government costs and would result in an unfavorable competitive position for the Commonwealth if unchecked.

Lack of water flow during periods of low rainfall affects the well-being of communities and industries alike. Without a continual flow into streams and reservoirs during periods of drought, water supplies will require increasingly larger reservoir capacities and the disposal of waterborne wastes will be difficult or impossible.

> It is estimated that lack of water flow in the Delaware River costs industry in that area half a million dollars a year because of intrusion of salt water during periods of drought. (9)

Stream Pollution

The effects of the dumping of untreated human waste and industrial waste into the streams and rivers of Pennsylvania hardly require repetition. They include:

> **Menace to public health.**
>
> **Increasing difficulties** and costs in providing adequate drinking water for communities and also in providing adequate good quality water necessary for many industrial processes and for the power plants of factories.
>
> **Menace to harbor facilities** and subsequent loss in foreign and coastwise shipping.
>
> **Loss in recreational opportunities** particularly near urban centers.

One example of increased governmental costs is found in the expenditure which some authorities feel will be ultimately necessary to provide Philadelphia with an adequate water supply from a distant source.

> This expenditure estimated at $150,000,000 and upwards **would be unnecessary**—IF Philadelphia could continue to obtain its water from the Delaware River. Stream pollution makes this present source highly unsatisfactory.

These effects create a perpetual annual levy which in turn raises living and manufacturing costs and deprives Pennsylvania residents of natural recreational facilities. They also reduce the advantages of the State in meeting competition with other states for the tourist and vacation trade.

CONSERVATION OF FOREST RESOURCES

Relation of Forest Resources to Industrial Development and Full Employment in Pennsylvania

Pennsylvania has the largest area of forest land located close to the greatest markets for forest products. Fifty-two per cent of the land in Pennsylvania is forest land. (10)

Less than one-fourth of the lumber consumed in the Commonwealth is harvested on this forest land. (11)

The annual growth of wood in the forests of Pennsylvania at present is estimated to be 502,500,000 cubic feet. The annual drain (volume removed by cutting, pests and disease) is approximately 310,000,000 cubic feet as compared to 120,000,000 cubic feet annual drain ten years ago. The increment is in small sized trees. (11)

Employment opportunities in forest product industries in Pennsylvania are great. Development of these opportunities will be contingent upon a sustained-yield crop. (11)

Condition of Forest Land in Pennsylvania

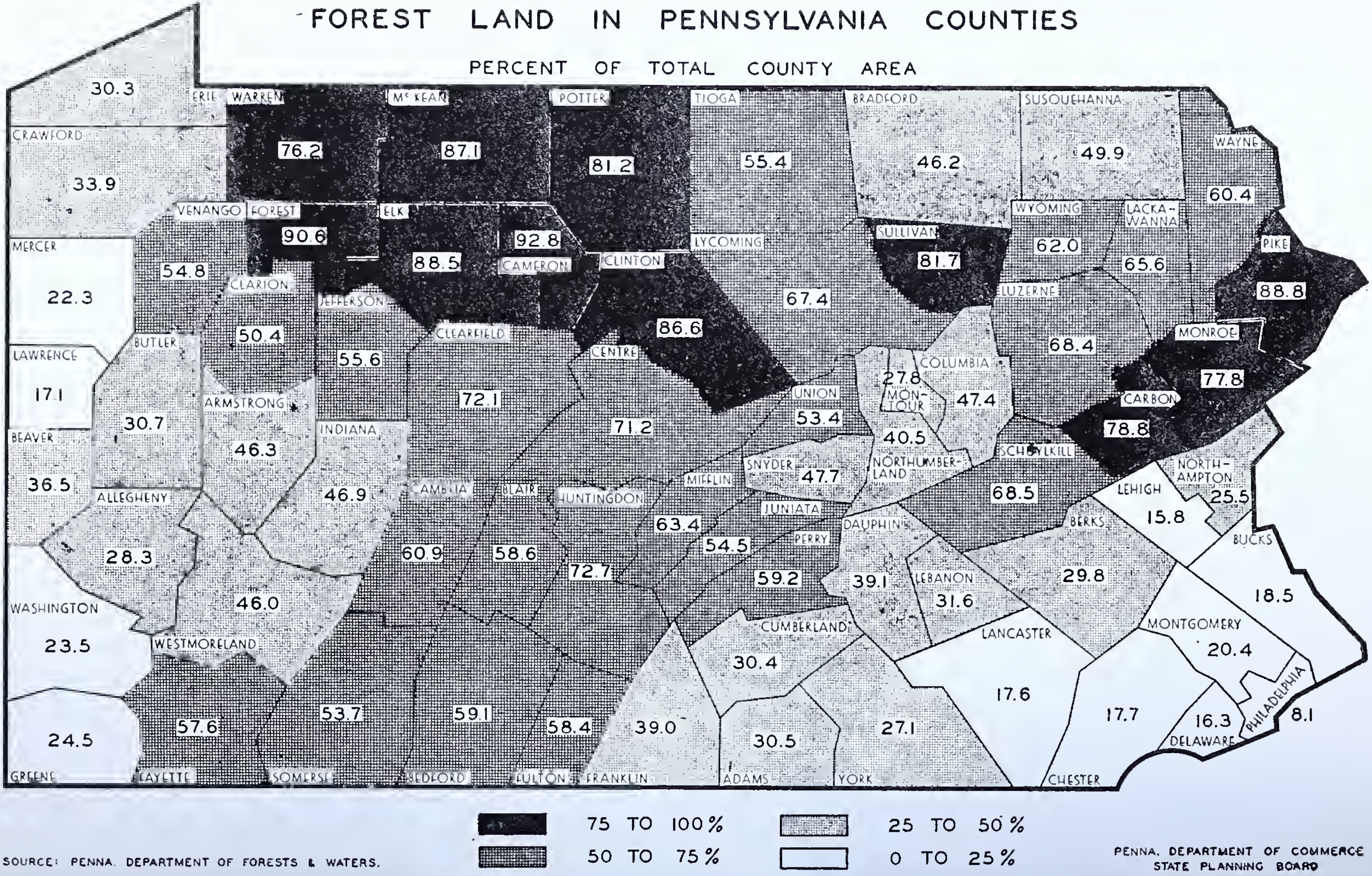
Saw timber at the present time is being harvested from only **about ten per cent** of our forest land. (11)

At least eighty per cent (including most of the ten per cent previously indicated as now being harvested) is producing material which would eventually develop into saw timber. Some of this area, however, will be harvested for cordwood of various kinds rather than saw timber. (11)

Twenty per cent is not restocking itself at an appreciable rate with commercially desirable trees. (11)

FOREST LAND IN PENNSYLVANIA COUNTIES

PERCENT OF TOTAL COUNTY AREA



SOURCE: PENNA. DEPARTMENT OF FORESTS & WATERS.

PENNA. DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

Our State was once covered by fine forests—

but large tracts have now become forest graveyards.

Many promising young stands are ruined by fire—

while repeated burnings destroy all trees and create waste land.

Ownership of Forest Land (12)

Twenty per cent of forest land is publicly owned.

Twenty per cent is owned as farm wood lots.

Sixty per cent is in large holdings, owned principally by individuals and corporations.

Forest Land Must Produce a Maximum Crop

Pennsylvania has adequate wooded areas to raise forest products sufficient to balance its entire consumption needs and even have some for export. To accomplish this will require measures that will encourage development of forest resources under all three classes of ownership so that *forest land will ultimately produce a maximum crop on a sustained-yield basis.*

Assurance that this will be accomplished will encourage forest products industries to be established in Pennsylvania.

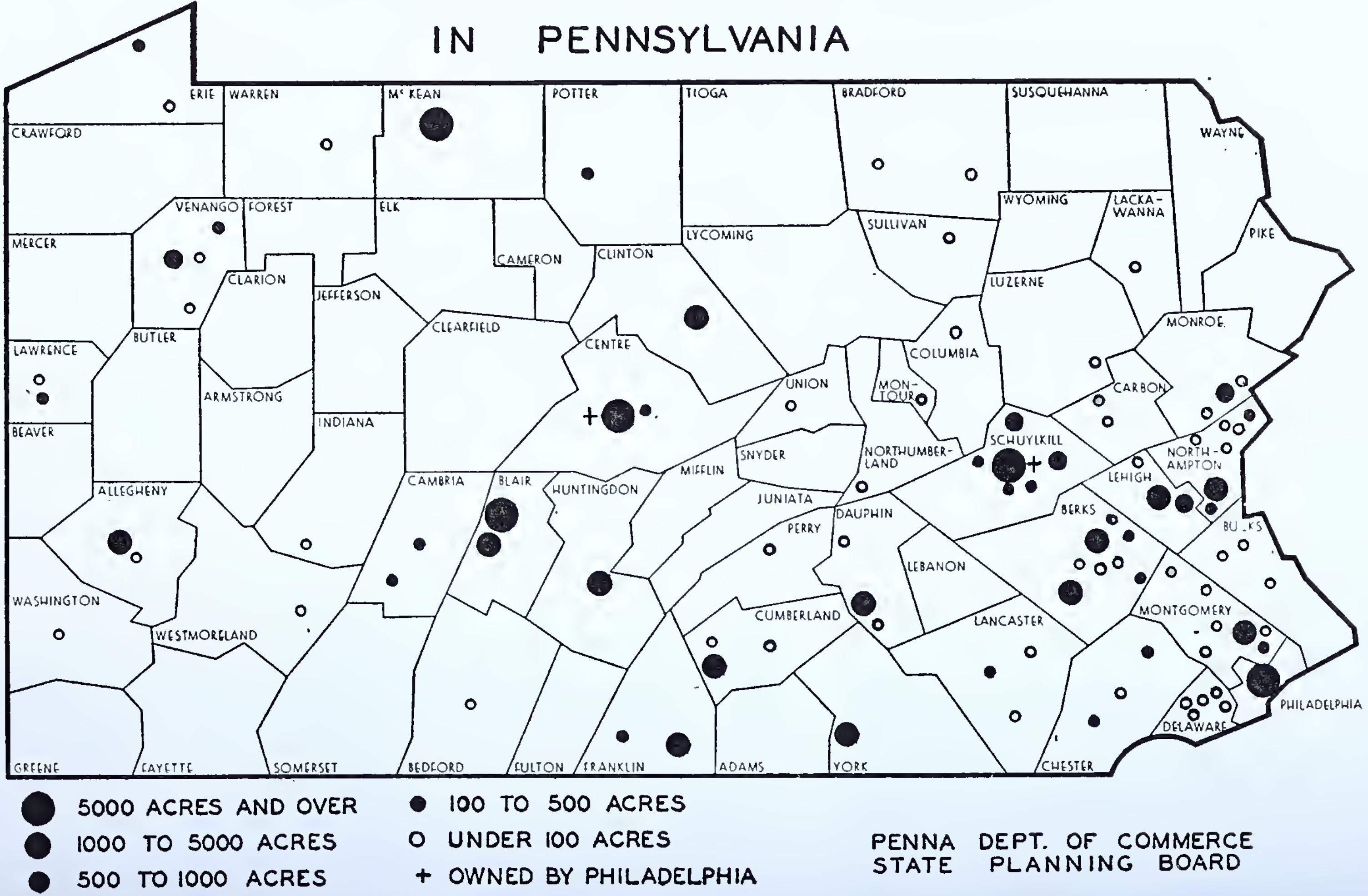
Ultimate accomplishment will insure expansion and perpetuation of forest products industries on a much larger scale. (These industries in 1920 employed 35,392. By 1940 employment had declined to 24,753. Lumbering alone had declined from 3,645 in 1920 to 1,003 in 1940.

It will ultimately provide a constant source of revenue for the forested areas of the State.

> These areas are now largely dependent upon more favorably situated areas to pay their school, highway and public health expenses. Development of forest resources can provide the income necessary for self-sufficiency and higher standards of living, and at the same time, reduce the taxes of agricultural and industrial areas.

It will lower costs to the consumer by reducing the transportation costs of forest products from far distant areas. These costs often exceed total production costs.

EXISTING COMMUNITY FORESTS IN PENNSYLVANIA



DATA FROM DEPT. FORESTS & WATERS

PENNA DEPT. OF COMMERCE
STATE PLANNING BOARD

CONSERVATION OF RECREATIONAL RESOURCES

The Extent of the Tourist and Vacation Trade

The tourist and vacation trade in 1941 amounted to over $400,000,000 in Pennsylvania and was exceeded only by the steel, machinery and wearing apparel industries in the State. (13)

Deficiencies in Recreational Facilities

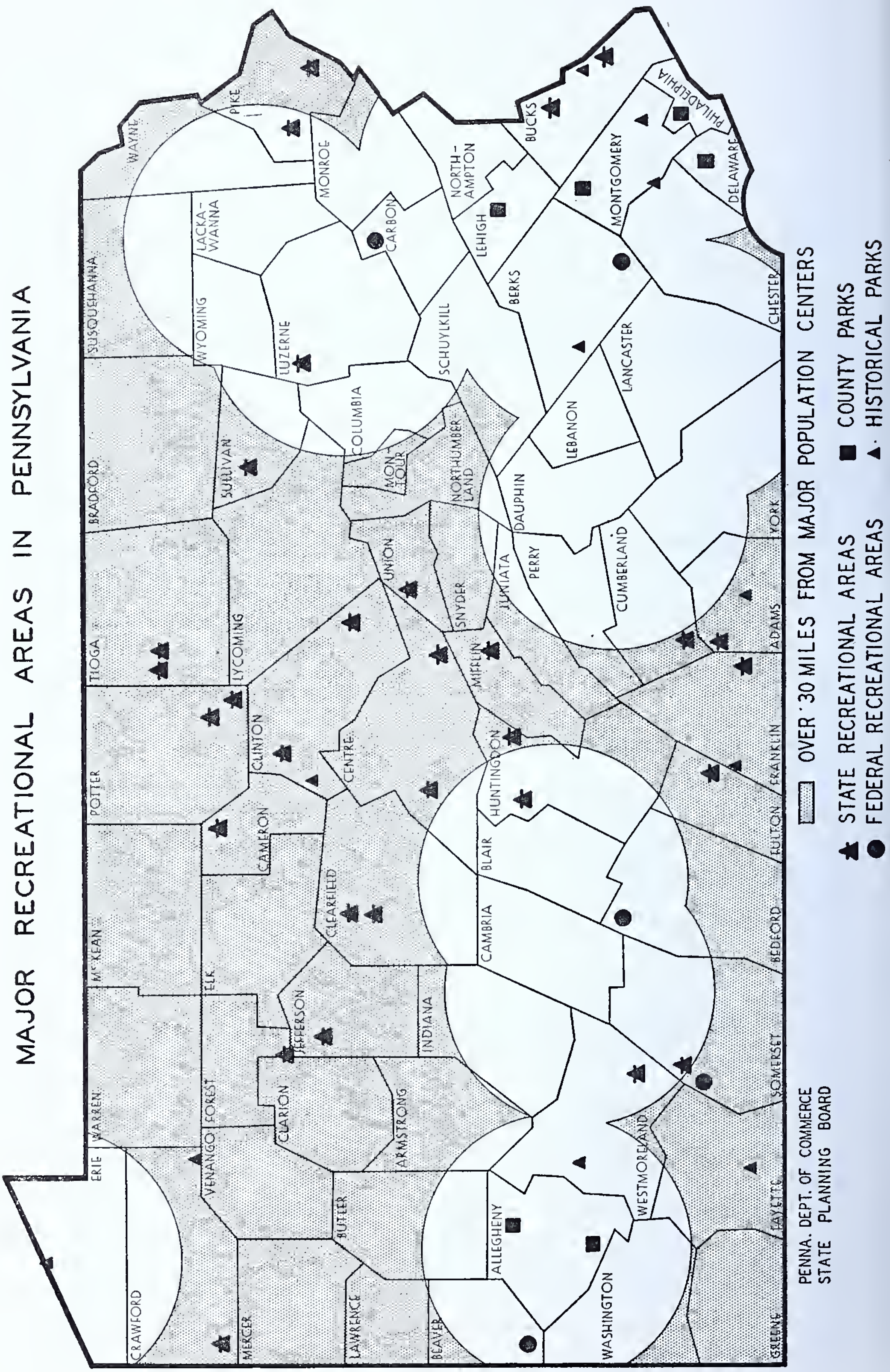
In relation to generally accepted standards of State Parks, 10 acres per 1,000 people, Pennsylvania has only 1.9 acres per 1,000, whereas New York has 13, Indiana 4, Michigan 8.2 and California has 51.2 acres per 1,000 people.

Existing State Parks are too far from urban centers to benefit a majority of the residents of the State.

Present appropriations are inadequate for the development and maintenance of a satisfactory State Park Program.

Local recreational facilities although generally conceded to be a local responsibility are far from meeting even minimum standards. Local communities are in great need of advice and information as to methods of sound recreational development.

MAJOR RECREATIONAL AREAS IN PENNSYLVANIA



PENNA. DEPT. OF COMMERCE
STATE PLANNING BOARD

Steam shovels rip away the soil to mine the coal—

leaving ridges of waste land and deep gullies which will produce neither farm crops nor taxes.

But the waste lands of strip-mining can be shaped and planted with trees—

whose roots will bind the loose soil and keep it in place—

until the ugly scar is effaced and a crop of timber is maturing.

Highways as a Part of a Recreational Development

The highways have become an important factor not only in expediting travel but in providing enjoyment and relaxation while en route.

Encouragement of tourist and vacation trade will depend to a large degree not only on highway design and construction to meet traffic needs but upon roadside developments that will encourage travel in Pennsylvania through the saving of our scenic beauty and reducing traffic hazards created by some types of roadside developments.

Conservation and full use of the public investment in highways will require consideration of these factors in future highway development.

Wild Life Resources in Pennsylvania

Outstanding opportunities for recreation in hunting and fishing are available in Pennsylvania. Further development of wild life resources can add greatly to the recreational facilities of the Commonwealth.

Interrelation of Recreational Program

Balanced coordination between the various phases of recreational development is essential if Pennsylvania is:

To conserve its outstanding recreational facilities.

To meet increasing recreational needs.

To insure wise investment in any new developments or improvements.

To encourage maximum tourist and vacation trade in the State.

To maintain high State-wide levels of employment and opportunity in the tourist and vacation field.

CONSERVATION OF MINERAL RESOURCES

Pennsylvania's most important natural resources in total value produced have always been its metallic and nonmetallic minerals.

These include iron, coal, cement and lime rocks, clays, stone, glass sands and petroleum. Heavy drains have been made upon these resources.

The rapid decline in American high-grade iron ore, the leveling off of Pennsylvania petroleum production, the decline in the State's output of natural gas and the need for new and economical sources of raw materials for metallic and nonmetallic mineral industries are threats to the economic future of the Commonwealth

Former methods of coal mining have resulted in great losses of fuel.

The destruction of land through stripping and dumping has been considerable.

Present methods of petroleum extraction are approaching their limits in recovery of oil.

An extensive program of geologic exploration, research into new methods of extraction and the elimination of waste are all essential to a conservation program that would insure the largest final yield of the most important natural resources of the State—its minerals.

A Conservation Program for Pennsylvania

The basic elements of the following Conservation Program were transmitted to the Governor in January 1944. After some enlargement and revision the Program was presented to the Governor and the General Assembly during the Legislative Session of 1945.

The parenthetical notes cover Acts passed during this Session and approved by the Governor.

It will be noted that much of the remainder of the program consists of administrative policies and programs requiring no additional legislation.

SOIL CONSERVATION AND LAND UTILIZATION

1. Promotion of soil conservation measures through:
    a. Increased educational activities by Agricultural Extension Service, Public Schools, Grange, etc.
    b. Expansion by Agricultural Extension Service of present staff of Soil Conservation Extension Specialists to permit more effective technical assistance to farmers.
    c. Support and promotion of group action of farmers in soil conservation either through informal cooperation of land owners or through establishment of Soil Conservation Districts.
    d. Legislative revision of present Soil Conservation District Law for the purpose of simplification and broadening the scope thereof.

> **House Bill 1104—Act 217** relating to soil conservation and soil erosion establishes a revised procedure for creation of Districts through local action and changes composition and responsibilities of the State Soil Conservation Commission.

2. Increase effectiveness of general advisory service to Pennsylvania farmers through:
    - a. Further decentralization of agricultural experiment program so that experimental work will be conducted in areas where the results will be applied.
    - b. Expanded experimental work particularly on development of agricultural crops useful for industrial purposes.
    - c. Expansion of Agricultural Extension Service to disseminate information developed through the above.

3. Intensify farm-forest program to speed up reforestation of submarginal fields on active farms and to secure more productive cutting and replanting practices on present farm wood lots through:
    - a. Increased emphasis by Agricultural Extension Service.
    - b. Employment by Department of Forests and Waters on matched fund basis with Federal government of ten Farm-Forest Extension Specialists in addition to the four such Specialists now being used.
    - c. Legislative authorization for tax postponement on land devoted to timber growth. (To accomplish objectives of P. L. 1196, Session of 1935, which was declared unconstitutional in 1941.)
    - d. Active program to familiarize farmers with danger of overgrazing in farm wood lots.

4. Reforestation and more effective utilization of publicly-owned lands through the following measures:
    - a. Increase forest nursery facilities now to be ready for post-war reforestation program.
    - b. Reforestation of State Forest Lands as postwar public works project.
    - c. Execution of comprehensive postwar public works programs proposed by Department of Forests and Waters.
    - d. Plan for extension of State Forests by purchase when funds are available or by gift of surface rights from coal companies, etc.

Fortunate are the people who enjoy skating in winter—

and bathing in the summer time in this fine County Park.

State Parks are needed to provide adequate recreation for millions of urban dwellers—

away from the heat and confusion of the city.

e. Promote, in every way possible, establishment of county and municipal forests in suitable areas, based primarily on utilization of tax delinquent lands supplemented by land purchases, where advisable, and reforestation as postwar projects.

f. Continuation and expansion of fire prevention and control programs.

> **House Bill No. 68—Act No. 83-A** appropriates $16,500,000 to the Department of Forests and Waters, of which an undetermined proportion is to be used for the above purposes.

g. Encourage utilization of State Game Lands for both game and timber production, recognizing that carefully planned selective timber cutting on State Game Lands will not only produce greatly needed timber but also will produce revenue for financing game propagation and further land acquisition, and will result in all-age forests which will support more game than is possible in mature forests.

5. Increase forestry production on privately-owned lands through:

a. Increased educational activity concerning reforestation and sustained yield management of privately-owned land.

b. Study and possible legislative action concerning State control of timber cutting on private forest land as recommended by the Interstate Committee on Forestry Problems and as now being studied by the Pennsylvania Commission on Interstate Cooperation and the Department of Forests and Waters.

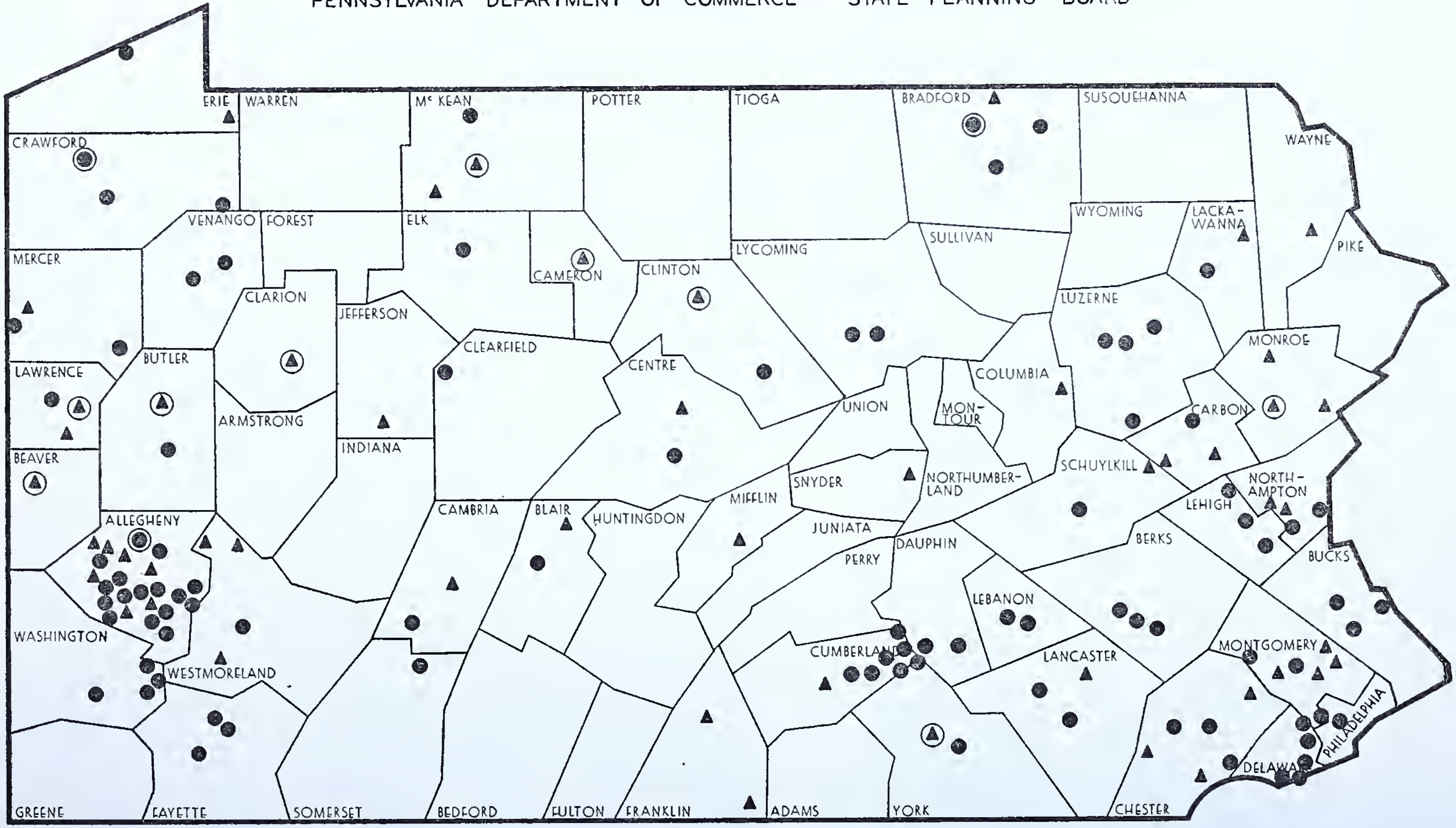
c. Encouragement of reforestation or other planting of mine waste piles, both to increase timber production and to avoid blowing and washing of waste material.

> **Senate Bill No. 183—Act No. 418** provides for the above through establishment of State regulation of strip mining practices.

6. Generally increase effectiveness of both private and public land use through:

LOCAL PLANNING AGENCIES IN PENNSYLVANIA

PENNSYLVANIA DEPARTMENT OF COMMERCE   STATE PLANNING BOARD



CONTINUING OFFICIAL AGENCIES

● LOCAL PLANNING COMMISSIONS

◉ COUNTY PLANNING COMMISSIONS

TEMPORARY QUASI-OFFICIAL AGENCIES

▲ LOCAL POSTWAR PLANNING COMMITTEES

Ⓐ COUNTY POSTWAR PLANNING COMMITTEES

a. Analysis of land potentiality by the continuance of land classification studies by School of Agriculture, Pennsylvania State College.

7. Strengthen land protection measures, such as:

   a. Study and improvement of highway drainage practice to avoid flood damage to adjoining agricultural lands.

   b. Postwar program of protective planting on highway cuts and fills to prevent erosion damage.

   c. Special consideration in original highway alignment and design to reduce the effects of soil erosion on the right-of-way and on abutting properties.

   d. Enactment of suitable regulatory legislation concerning strip mining to ensure return of land to forest production or other productive use, and to avoid damage to adjoining property values and loss of public tax base.

      Senate Bill No. 183 — Act No. 418 establishes State regulation of strip mining practices.

   e. Study and remedial action on land abuse resulting in slides affecting railways and highways (such as critical area along Lehigh River above Mauch Chunk).

   f. Protection of rural property values and public tax base through application of zoning authority of counties and townships and through passage of State Highway zoning act.

8. Protection and development of scenic and recreational resources through:

   a. General roadside protection measures outlined in paragraph 7 above.

   b. Control of commercial and other nonagricultural developments along highways through local zoning (see State Planning Board publications on "Planning and Zoning; Powers and Procedures" for Cities, Boroughs, Townships, Counties and Regions) and through enforcement of other existing laws. (Forbidding erection of signs without consent of property owner, P. L. 20—1903. Power of townships of the second class to control storage of junked automobiles, etc., P. L. 41—1939.)

c. Development of Roadside Rests and Picnic Areas as postwar public works projects by State Highway Department and provision for such Rests in land acquisition for new highways.

    House Bill No. 119—Act No. 401 provides for establishment of Roadside Rests by the Department of Highways and appropriates $150,000 for this purpose.

d. Maintenance and more adequate development of present State Parks by Department of Forests and Waters and especially the development of additional State Parks near metropolitan areas as postwar public works projects.

    House Bill No. 68—Act No. 83-A appropriates $16,500,000 to the Department of Forests and Waters of which an undetermined amount is to be used for the above purpose.

WATER CONSERVATION

1. Improvement of stream flow characteristics—reduction of floods and avoidance of extreme low flow conditions—through:

    a. Soil conservation and land utilization measures, outlined in preceding section, to decrease rapidity of run-off, to replenish underground waters, etc.

    b. Stimulation of construction of a large number of comparatively small multiple purpose ponds or reservoirs both on privately-owned land (as stock-watering ponds, fire-fighting reserves, recreation developments, etc.) and on publicly-owned land (as postwar public works projects for flood control, low flow control, recreation, fish and wild life benefits, etc.).

Modern highways designed to fit the topography, conserve soil, scenic resources, time and nervous energy of the motorist.

The alignment fits the natural features of the rugged topography. The steep slope on the right will be protected by planting.

Secondary roads fitted to the landscape with rounded, sod-covered banks—

and parkways are both products of a team of engineers and landscape architects working together.

House Bill No. 68—Act No. 83-A, the appropriation to the Department of Forests and Waters provides funds which may be used for such construction.

2. Improvement of quality of water through:

   a. Continued aggressive activity by Department of Justice, the Sanitary Water Board, Department of Health, Department of Mines, the Department of Commerce and other agencies to reduce stream pollution by municipalities, mines and industries.

      House Bill No. 1—Act No. 177 strengthens the "Pure Streams Law of 1937" through regulation of the disposal of coal culm and acid mine drainage in the streams.

   b. Continued emphasis on municipal sewage treatment plants in the postwar public works program being developed by the State Planning Board.

      House Bill No. 67—Act No. 82-A appropriates $10,325,000 to the Department of Health for general stream clearance work, a portion of which is available for the cost of preparing plans for municipal sewage treatment works.

      Senate Bill No. 8—Act No. 413 appropriates $1,000,000 toward the preparation of plans for public works by municipalities.

      Senate Bill No. 423—Act No. 164 provides for incorporation of "Authorities" with revised powers which enlarges local opportunities for construction and operation of sewage treatment works.

   c. Continued activity by the Interstate Commission on the Delaware River Basin in the field of stream pollution abatement in the portions of the four states comprising the Delaware River Basin.

   d. Ratification by Pennsylvania of the Ohio River Valley Water Sanitation Compact.

House Bill No. 631—Act No. 50 ratifies the Ohio River Valley Water Sanitation Compact.

e. Approval of Pennsylvania's participation in the Interstate Commission on the Potomac River Basin.

   House Bill No. 1139—Act No. 405 creates a commission to act jointly with commissions of other states to constitute an Interstate Commission on the Potomac River.

f. Passage of the Act already approved by the States of New York, New Jersey and Delaware, creating interstate standards of water purity for the Delaware River.

   House Bill No. 662—Act No. 123 promotes interstate cooperation for the conservation of water resources in the Delaware River Basin especially through the establishment of pollution standards.

g. As a postwar public works project, a continuation of the mine sealing program for the reduction of acid mine drainage from abandoned mines and inactive workings.

   House Bill No. 67—Act No. 82-A appropriates $10,325,000 to the Department of Health, part of which is to be used for sealing of abandoned mines.

h. Acceptance by the Commonwealth and suitable action thereon, of the recommendations of the Interstate Commission on the Delaware River Basin for the apportionment of responsibility between the Commonwealth, the mine operators, and the Federal government for the various elements of the Schuylkill River Valley Restoration Program.

   House Bill No. 1068—Act 441 appropriates $5,000,000 to the Water and Power Resources Board for removal of silt in the Schuylkill River.

MINERALS CONSERVATION AND DEVELOPMENT

1. Continuation and development of State policy which regards coal and oil underlying State Forest and State Game Lands as a public reserve to be conserved where possible for future generations.

2. Improvement of coal mining practices to conserve coal and to improve competitive position of Pennsylvania coal with respect to other fuels through:

    a. Promotion of development and use of more effective coal mining and handling machinery.

    b. Development and utilization of more efficient recovery methods for fine sizes of coal to conserve coal and to avoid stream pollution.

    c. Development and promotion of more efficient stokers for domestic use of anthracite and bituminous coal.

    d. Promotion of cooperative research and pilot plant operation leading to development of new uses of anthracite and bituminous coal and their by-products.

    e. Expansion of the research program of the School of Mineral Industries of Pennsylvania State College to accomplish these and other objectives.

3. Improvement of oil recovery methods through:

    a. Continued and expanded support of work now being done by the School of Mineral Industries and the Bureau of Topographic and Geologic Survey of the Department of Internal Affairs.

4. Development of possibilities of mining and utilizing low grade iron ores, slate and other minerals in Pennsylvania through:

    a. Continued and expanded support of investigatory work being done by the Bureau of Topographic and Geologic Survey of the Department of Internal Affairs and the School of Mineral Industries of Pennsylvania State College.

CONSERVATION OF WILD LIFE, FISH AND GAME

1. Continuation of present programs of Game Commission and Fish Commission with following extensions:

   a. Increase the number of game and wild life refuges in appropriate locations on both public and private lands.

      Senate Bill No. 324—Act No. 45 providing for auxiliary state game refuge projects in cooperation with private land owners.

   b. Increase the size and number of public hunting and fishing areas by land purchases and by expansion of farmer-agreement program.

   c. Increase the small-game stocking program, with hunter load (as determined by number of licenses issued) a principal factor in determining amount of stocking for a given area or county; same to be attended by greater law-enforcement effort in the field.

   d. Expansion of fish culture and fish stocking program, with special emphasis upon stocking warm water streams and lakes with indigenous fishes including bass and pan fish.

   e. Inaugurate joint fish culture and stocking programs with adjoining states for the Delaware River.

   f. Extend the policy of differentiation in fish and game regulations, by counties, in accordance with varying conditions and requirements.

CONSERVATION OF MAN-MADE RESOURCES

1. Protection and development of industrial and commercial resources:

   a. Continuation of program of Pennsylvania Department of Commerce to utilize all idle industrial property to conserve property values and to maintain employment opportunity as well as to avoid unnecessary migration.

These recreational assets are—

—unrivaled in eastern United States.

Wise conservation measures brought back our wild turkeys—

—and the fish in our streams.

2. Protection and development of urban areas.

   a. Protection of public tax base and private property values and improvement of community conditions through the support and utilization of local and regional planning commissions and the development and adoption of planning measures such as zoning ordinances, land-subdivision regulations, building codes, etc.

   b. Analysis of deficiencies in local municipal facilities and services through study of local planning commissions and community self-appraisal groups and remedying of such deficiencies through postwar public works programs.

   c. Analysis and improvement of housing conditions through study and preparation of postwar plans by cooperative action of local housing agencies, local authorities, private capital, etc.

   d. Incorporation into local, county and State postwar public works program of mine subsidence prevention measures and flood control measures for protection of homes and industrial sites.

   e. Urban redevelopment legislation to facilitate both public and private enterprise in slum clearance and rehabilitation of blighted urban areas.

House Bill No. 1130—Act No. 382 amends "Insurance Company Law" authorizing investment in housing projects.

House Bill No. 1131—Act No. 383 authorizes county, city, borough, town, township public bodies to aid redevelopment authorities.

House Bill No. 1132—Act No. 384 transfers the State Board of Housing to the Department of Commerce, enlarges its powers and appropriates $75,000.

House Bill No. 1133—Act No. 385 authorizes the creation of Redevelopment Authorities to engage in the elimination of blighted areas and provides for the exercise of their powers.

3. Protection and development of highways through:

   a. Continued systematic appraisal of Pennsylvania's highway needs and development of solutions therefor.

   b. Protection of traffic-carrying capacity of existing and proposed highways and avoidance of premature obsolescence by guidance of roadside developments by:

      Exercise of existing zoning authority of counties, cities, boroughs and townships.

      Passage of State highway zoning act and utilization thereof.

      Planning and construction of "limited access" highways where conditions indicate the need.

      House Bill No. 138—Act No. 402 authorizes the establishment of limited access highways by the Department of Highways.

   c. Extension of permissible highway right-of-way width when conditions warrant to achieve:

      Future pavement widening at lower cost.

      Adequate protection for traffic from encroachment by abutting property owner.

      Flatter side grades to reduce soil erosion.

      Adequate space for protection of existing trees and for future planting.

   d. Greater integration of engineering principles with landscape architectural principles in the original alignment and design of new highways to obtain advantages of both viewpoints.

      Roadside improvement programs are generally more costly and often are denied the opportunity of dramatizing Pennsylvania's variable land character and scenic values when applied after the highway is built.

REFERENCE NOTES

(1) "Soil Erosion Survey of Pennsylvania" by the Pennsylvania State College. Bulletin #354. School of Agriculture and Experiment Station.

(2) The Control of Reservoir Silting by U. S. Department of Agriculture. Bulletin #521.

(3) Report of G. D. Houtman, Assistant County Engineer, Media, Penna.

(4) "Stream Pollution in the Schuylkill River Basin" by the Interstate Commission on the Delaware River Basin.

(5) "Report of Loss and Damage March 1936 Flood in Pennsylvania" by National Emergency Council.

(6) "The Floods of May 1942 in the Delaware and Lackawanna Basins", Penna. Department of Forests and Waters in cooperation with U. S. Department of Interior Geological Survey.

(7) "The Flood of July 1942", Penna. Department of Forests and Waters in cooperation with U. S. Department of Interior Geological Survey.

(8) "Highway Builder" Sept. 1942 from information by Penna. Department of Highways.

(9) James H. Allen, Executive Secretary, the Interstate Commission on the Delaware River Basin.

(10) "Pennsylvania Forest Area by Counties" by Allegheny Forest Experiment Station in cooperation with the Penna. Department of Forests and Waters and the State Planning Board.

(11) Pennsylvania Department of Forests and Waters, Bureau of Forests.

(12) "The Role of Forests in Pennsylvania's Economy", Allegheny Forest Experiment Station, U. S. Department of Agriculture.

(13) Pennsylvania Department of Commerce and U. S. Department of Commerce—Tourist Bureau.

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Publication
No.

1—Preliminary Report. 682 pages, 152 charts, December, 1934.

10—Drainage Basin Study. 3 vols., 611 pages, 1937.

*11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

*12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

*13—The Pennsylvania Zoning Primer. 1940.

*14—Industrial Utility of Water. Part I. (Temperatures and Chemical Content at Low Flow.)

In addition to these publications the following issues of **Pennsylvania Planning** supply information of value in connection with community self-appraisal and local planning and zoning programs:

*Local Tax Rates, May-June, 1940.

Index of Publications, August, 1941.

*Community Self-Appraisal (Revised Edition), April, 1942.

*Comparative County Data, May, 1942.

*Planning and Zoning Progress in Pennsylvania, July, 1942.

*Population, October, 1942.

*Handicrafts in Post-War Planning, May, 1943.

*Plastics, July, 1943.

*Air Photographs, February, 1944.

*Light Metals and Stainless Steel, August, 1944.

*Topographic Mapping Needs, February, 1945. (For limited technical distribution.)

*Community Action for Local Self Development, July, 1945.

These publications may be seen in representative public libraries. A limited number of those marked with an asterisk are available for distribution until the present supply is exhausted.

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TOPOGRAPHIC MAPPING NEEDS

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

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FEBRUARY, 1945

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Pennsylvania Planning

TOPOGRAPHIC MAPPING NEEDS

Recommendations
for
Priorities and Scales in Pennsylvania

* * *

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

FEBRUARY, 1945

TOPOGRAPHIC MAPPING NEEDS

The State of Pennsylvania, in common with the other Stat of the Union, has a deep and continuing interest in getting a maintaining adequate map information of its area. Topographi maps on scales of 1" equals 1/4 mile, 1/2 mile, and 1 mile, a showing contours, are generally considered the basic maps. Un modern methods they are made from aerial photographs, with a minimum of ground control, and show the usual features in hor zontal and vertical position.

Of course Pennsylvania needs other map information besid that which is ordinarily shown on topographic maps. It needs soil maps, which show the various kinds of soils and their location; maps for the control of soil erosion; maps which show the various kinds of timber in the State's forested areas; an hydrographic charts with shore-line information and water dep for use in navigation; etc. But these, for the most part, ar based upon the photographic and other information which is assembled in making a standard topographic map. If it is necessary to compile such information before topographic maps are available in the areas, a good part of it can be used later i making topographic maps of the area covered.

The topographic map, therefore, is always of fundamental importance. Although these and the other principal kinds of maps are made by federal agencies, the Commonwealth of Pennsylvania has made appropriations for many years for cooperation in financing the mapping programs and is interested in advisi the Federal Government as to the order of priorities in which mapping within the State should be undertaken.

In December, 1936, the State Planning Board made a study of this matter which was published in "The Status of Mapping Pennsylvania". Recently, the Board has re-examined the State needs for standard topographic maps. The procedure for doing this, developed by the Board in cooperation with representati of federal agencies and in consultation with the Bureau of Top graphic and Geologic Survey of the Pennsylvania Department of Internal Affairs (the State agency responsible for the State-Federal mapping programs), is presented in this publication. It is believed that it may be of interest not only to State agencies and to utility and business corporations in Pennsylvania, but, perhaps, to other states as well.

The recommendations growing out of this study of Pennsylvania's topographic mapping needs, after being checked with th Bureau of Topographic and Geologic Survey, have been forwarde by the State Planning Board to the Bureau of the Budget, in th Executive Office of the President of the United States. The federal agencies which make topographic maps, and other principal kinds of maps and charts, make annual requests to the Co gress for funds for such purposes. Under existing law these first submitted to the Bureau of the Budget, for review and r ommendation to the President, who then transmits his final re ommendation to the Congress.

The Bureau of the Budget regularly receives reports from federal establishments as to their need for topographic and other maps. A representative is assigned by each of such agencies for this specific purpose. These, singly, advise the Bureau's staff as to the current and future needs of their agencies for basic map information, and, as a group, assist in the formulation of an annual program. Under their advices the Bureau had determined specifications (see Appendix), which establish a standard of acceptable accuracy for topographic mapping, and annually develops a program, expressing needs for such mapping in terms of priority areas.

Representatives of federal agencies are in close touch with federal, state, and local government operations throughout the Country, and their advice as to map needs, accordingly, reflect state and local needs for topographic maps. However, it is considered desirable that State Planning Boards or other appropriate state agencies supplement the federal advice by such study and recommendations as they may consider appropriate.

The Pennsylvania State Planning Board has, therefore, worked out the procedure of analysis and study described herein. It is considered adequate by the Bureau of the Budget. The Board does not necessarily recommend it as a pattern to be followed by other states, but merely presents it as being the story of its own operations.

Concurrently with this study and report upon the topographic mapping needs of Pennsylvania, the Board is also making a study of the overall geodetic control requirements in Pennsylvania. This is being done in collaboration with the United States Coast and Geodetic Survey, and the Board hopes to publish the results derived and the procedure employed at an early date.

Inception of Study

To initiate the study, the State Planning Board arranged a meeting of representatives of the various State departments, public utility companies operating in the State, and representatives of federal agencies.

Representatives of five State departments, eight public utility companies, and two federal agencies attended the meeting. All those attending expressed interest and agreed to cooperate in the plan of procedure outlined.

The Board's objective was to prepare a statement, in both graphic and list form, of the areas in which topographic mapping was needed, expressing such needs in four orders of priority. The statement was also to include recommendations as to the publication scale of the maps required.

It was pointed out at the first meeting that mapping needs were not necessarily to be limited to funds now available from State or federal sources, but should be determined on the basis of the engineering and planning activities of the respective agencies, without consideration of the source or amount of funds required.

Status of Basic Mapping

Topographic mapping, by quadrangles, was begun in Pennsylvania in 1884, and during the 60 years which have elapsed all but 5 quadrangles were mapped on the 1:62,500 scale. The areas mapped first, naturally, included the industrialized and thickl settled areas of the State. The 5 unmapped quadrangles are located in areas which are considered of minor economic value.

In general, early mapping served its purpose for a time. However, many of these maps now have become obsolete, especiall those quadrangles covering the highly urbanized areas where large-scale maps are required for present and future operations

During the past several years this deficiency has been remedied to a considerable extent by mapping done during the present war. Under this program, a number of quadrangles have been remapped on the original scale or mapped on a scale of 1:31,680. Although these maps have been restricted and not available for general use they may now be obtained for limited distribution.

Procedure

Maps of the State, on a scale of 1:1,000,000, (published by the United States Geological Survey), showing the 15-minute quadrangle layout, were furnished by the Board to each State department and public utility company participating in the stud On these maps, the quadrangles which were considered adequately mapped were shown. Each agency was requested to indicate its interest in having inadequately mapped areas - or unmapped ones mapped, and to designate the order of priority desired, for eac quadrangle. In order to show the desired priorities in each quadrangle, the number "1" was to be placed within the boundaries of all those quadrangles considered to be first priority, number "2" for second priority, and so on up to number "4" for fourth. Also, within each of the quadrangles desired to be mapped or remapped, the scales were indicated as follows: a vertical line for a scale of 1 inch = 1 mile (approximately), a horizontal line for a scale of 1 inch = 1/2 mile (approximately), and a diagonal line for a scale larger than 1 inch = 1/2 mile.

In general, first priority was understood to indicate an area in which the department or company desired to have published map copies available within (1) or (2) years; second priority, (2) to (3) years; third, (3) to (4) years; and fourth, priority within (4) or more years.

After these maps were completed by the State departments and the public utility companies, they were returned to the State Planning Board. The Board then proceeded to prepare two composite sheets or maps, one showing the requirements of the State departments and the other the public utility companies.

The composite map prepared from the advices of the State departments included the mapping needs and scales from five agencies as follows:

State Game Commission
Department of Health
Department of Forests and Waters
Department of Highways
Department of Internal Affairs (Bureau of
Topographic and Geologic Survey)

These five State agencies are probably those which are most concerned with the use of topographic maps. Since the activities of these agencies appear to vary widely, it was believed advisable to weight them according to their relative interests.

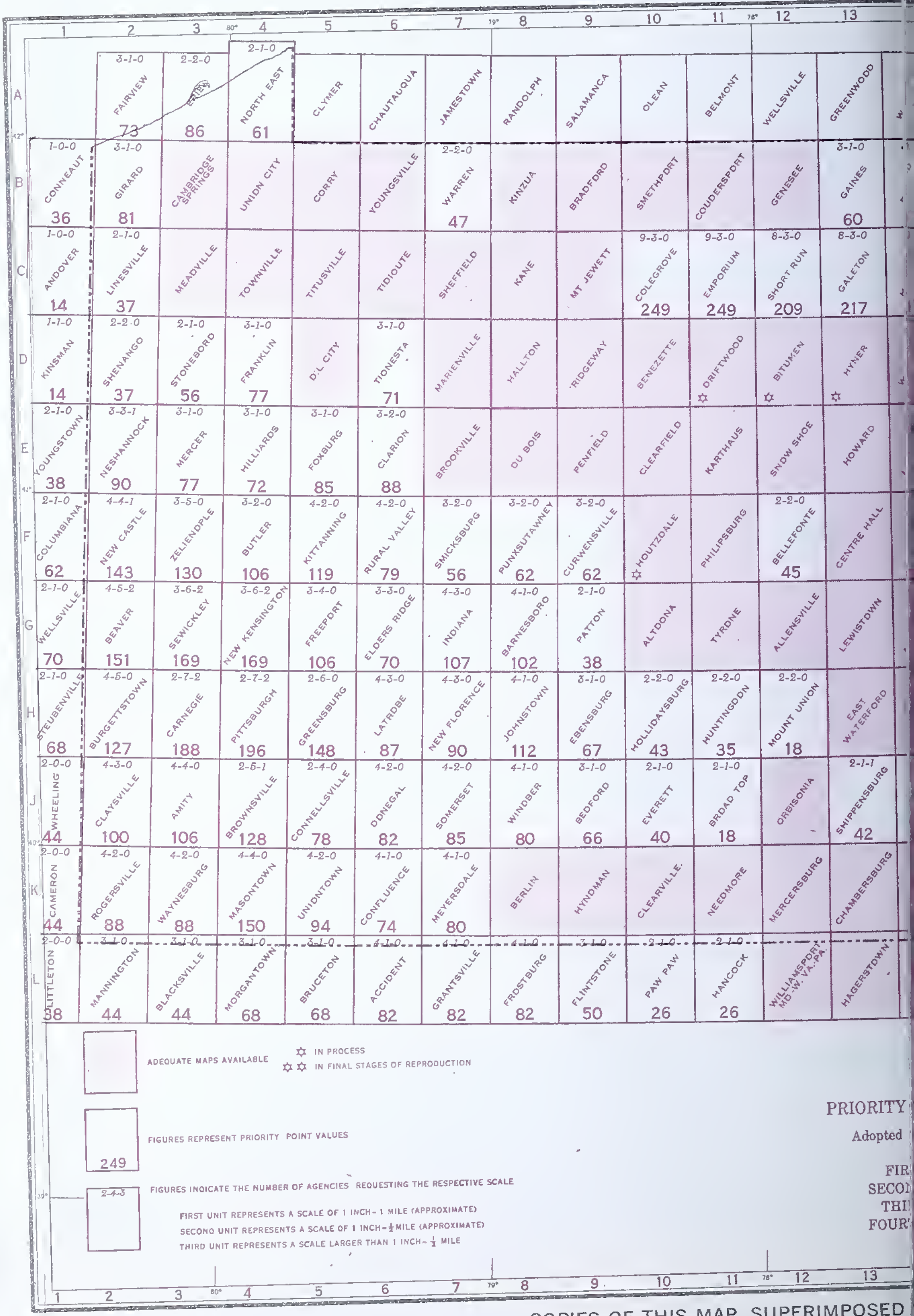
In order to place the priorities on a mathematical basis which would provide a range for selection of quadrangles within a priority, the Board assigned values for each priority, and a base weight for each department. These priority values, or points, multiplied by the base weight assigned each department give what is termed "priority point values". The following tables indicate the procedure adopted to determine the mapping requirements of the State departments.

Department	Base Weight	Priority Points			
		1st	2nd	3rd	4th
Game Commission	4	4	3	2	1
Health	5	4	3	2	1
Forests and Waters	6	4	3	2	1
Highways	7	4	3	2	1
Topographic and Geologic Survey	8	4	3	2	1

State Game Commission: This Commission was assigned a base weight of 4. Although it owns three-quarters of a million acres of land in the State, most of this area is unimproved land of comparatively low value. In consideration of the full use of topographic maps, it was determined that the purposes for which the Commission requires such maps were not as extensive as the Departments concerned with this study.

Department of Health: The Sanitary Water Board of this Department administers the sewerage and anti-pollution laws of the State and safeguards public water supplies. As the Department requires the use of topographic maps in order to discharge its functions relating to engineering problems, it was considered to be next in importance in the weighting system and was assigned a base weight of 5.

Department of Forests and Waters: In addition to its large holdings of State forest lands, the Department is also responsible for the protection of private forest lands. The Water and Power Resources Board, of this Department, exercises control over the use of the waters of the State which includes flood control structures, dams, encroachments, and stream diversions. This Department was assigned a base weight of 6 which appeared to place it in its relative order in the weighting system.



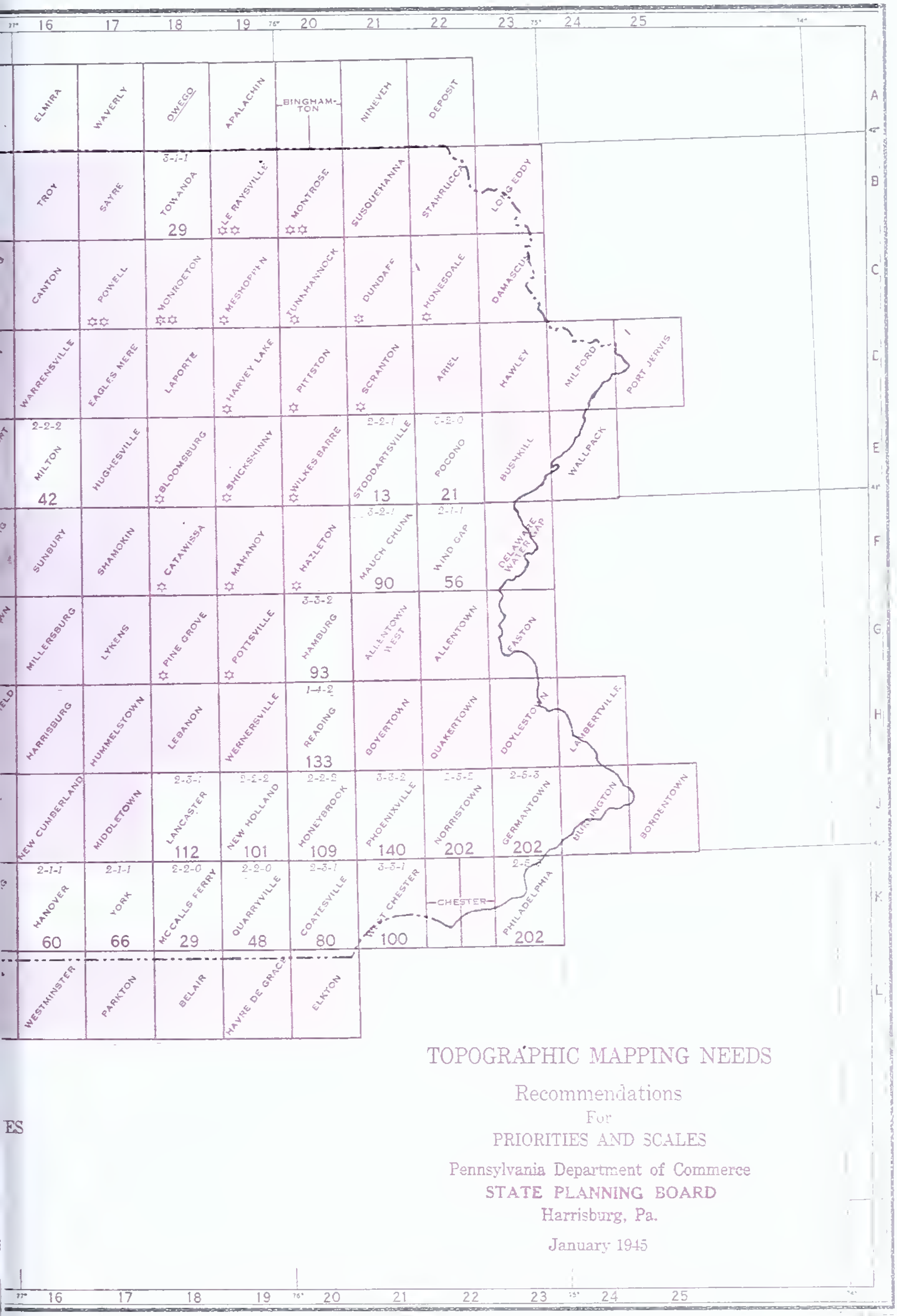
PRIORITY

Adopted

FIR
SECO
THI
FOUR

COPIES OF THIS MAP, SUPERIMPOSED
SHOWING COUNTIES, CITIES, STREAMS

PENNSYLVANIA



TOPOGRAPHIC MAPPING NEEDS

Recommendations
For
PRIORITIES AND SCALES

Pennsylvania Department of Commerce
STATE PLANNING BOARD
Harrisburg, Pa.

January 1945

,000,000 SCALE MAP OF PENNSYLVANIA
AVAILABLE UPON REQUEST.

State Highway Department: This Department spends millions of dollars each year on highway construction and the use of topographic maps is of primary importance. Although detailed surveys and large-scale strip maps are made along the routes of proposed highways, drainage and other engineering problems, as well as those of a general economic character, extend beyond the limits of the local survey and the boundaries of the right of ways. In consideration of the extensive use of maps by this Department, a base weight of 7 appeared to be desirable.

Department of Internal Affairs (Bureau of Topographic and Geologic Survey): The duties of the Bureau include, to undertake, conduct and maintain the organization of a thorough and extended survey of the Commonwealth for the purposes of elucidating the geology and topography of Pennsylvania. Such surveys involve the extent and character of various natural resources. The Bureau is in close touch with the mineral and extractive industries of the State and its views naturally reflect the mapping needs of these industries. In consideration of the scope of the functions and activities of this Bureau, it was assigned a base weight of 8.

Priority Point Values
(Base Weight x Priority Points)

	Priority Point Values			
	1st	2nd	3rd	4th
Game Commission	16	12	8	4
Health	20	15	10	5
Forests and Waters	24	18	12	6
Highways	28	21	14	7
Topographic and Geologic Survey	32	24	16	8
Maximum priority points possible	120	90	60	30

To obtain the priority point values for a quadrangle, the point values representing the priority specified, by each department, were totaled.

A similar composite map of the topographic needs of the public utility companies was then prepared. In selecting the public utility companies to be included in the study of Topographic Mapping Needs, the operating territories of each company were carefully studied. Those companies whose operations were confined to a small area embracing only a few topographic quadrangles were not considered.

A selection of the telephone companies was made whose territories would cover all or parts of most of the quadrangles of the State but with a minimum of overlapping with respect to the telephone territories. This same procedure was used in connection with the railroads and the electric power companies. The two largest natural gas companies were included in the study, although their combined territories covered only a portion of the State.

Even though the number of utility companies included in he study is a comparatively small number with respect to the ntire State, the methods utilized were considered to repreent each class of utility equitably. The companies which articipated in the program were as follows:

Bell Telephone
Commonwealth Telephone
Pennsylvania Telephone
Duquesne Light
Metropolitan Edison
Pennsylvania Edison
Philadelphia Electric
Pennsylvania Power & Light
West Penn Power
Peoples Natural Gas
United Natural Gas
Baltimore & Ohio Railroad
Pennsylvania Railroad
Reading Railroad

The priority points established for the utility companies ere inversely proportional to the figures designating the pririties, the same as used for the State departments, or 4 - 3 - - 1 for the respective priorities. It was determined that the equests of the public utility companies were highly important, lthough many of them were concerned only with specific local reas rather than a statewide coverage. As most of these comanies were interested in comparatively small areas, the amount f overlap in the priority requests was limited, and had the ffect of reducing the total priority points for the quadrangles n these localities. Because of this condition, it was decided o place these local requests on a comparable basis with the tate department having the highest base weight. As a result, base weight of "8" was assigned to each of the public utility ompanies. The priority point values for each company then, mounted to 4-3-2-1 multiplied by 8, or 32-24-16-8 for the repective priorities. If no overlapping of territories existed ithin each of the four groups of utility companies selected, he total priority point values for any quadrangle would not xceed 4 times 32 or 128 points. Actually it was not possible o select perfect coverage of this kind so that slight overapping of territories did occur. In the case of two quadangles the total priority point values reached 136 points.

A final composite sheet was then prepared which combined he requirements of the State departments and the public utilty companies. This was done by merely adding the point values or each quadrangle from the two sheets previously prepared. he final priority point values adopted for the respective pririties were as follows:

First Priority	112 to 249
Second "	82 to 111
Third "	61 to 81
Fourth "	31 to 60

This selection of priority point values resulted in rejecting the quadrangles having a total of less than 31 points, and 10 quadrangles were so rejected. These 10 quadrangles, together with the 126 quadrangles considered adequately mapped, left 100 quadrangles remaining upon which the four priorities were established. The limitations placed on the priority points, by adopting the above-mentioned figures, afforded a fairly even distribution of the number of quadrangles for each priority.

On the accompanying map, the priority point values which represent the combined recommendations received from the State departments and from the public utility companies appear in bold-faced vertical figures, at the bottom of each 15-minute quadrangle.

With regard to the scales desired, the small italic figures shown at the top of each quadrangle, such as 3-1-1, indicate the number of State departments or companies which requested the respective scales of 1 inch = 1 mile (approximately); 1 inch = 1/2 mile (approximately); and larger than 1 inch = 1/2 mile. For example: 3 agencies requested a scale of 1 inch = 1 mile; 1 agency a scale of 1 inch = 1/2 mile, etc.

The adequately mapped quadrangles are indicated on the accompanying map in half-tone.

The State Planning Board feels that this study should be of considerable value to the federal agencies concerned with mapping, and that the information should be given appropriate weight in the selection of the areas to be mapped.

The Board appreciates that much depends upon the amount of funds made available for mapping from year to year. The study made in Pennsylvania, however, should afford a means of selecting the areas to be mapped irrespective of the amounts appropriated for mapping purposes.

During this study, the State Planning Board received full cooperation from the State departments, public utility companies, and the federal agencies concerned. It was evident that the departments and utility companies were deeply interested in having an opportunity to express their mapping needs in terms of priority and scale, and thus assist in the process of programming topographic mapping in Pennsylvania.

APPENDIX

For the convenience of those interested in State and Na- ional mapping, the following "Standards for Map Accuracy" is oted from an article of the same title which was published n the Bulletin of the American Congress on Surveying and Map- ing, April, 1943. It was developed by the United States Bu- eau of the Budget, Executive Office of the President, under e advice of representatives from the principal federal map- nd chart-using departments and establishments:

STANDARDS FOR MAP ACCURACY

1. Horizontal accuracy. For maps on publication scales larger than 1:20,000, not more than 10 percent of the points tested shall be in error by more than 1/30 inch, measured on the publication scale; for maps on publication scales of 1:20,000, or smaller, 1/50 inch. These limits of accuracy shall apply in all cases to positions of well defined points only. "Well defined" points are those that are easily visible or recoverable on the ground, such as the following: monuments or markers, such as bench marks, property boundary monuments; intersections of roads, railroads, etc; corners of large buildings or structures (or center points of small buildings); etc. In general what is "well defined" will also be determined by what is plottable on the scale of the map within 1/100 inch. Thus while the intersection of two road or property lines meeting at right angles would come within a sensible interpretation, identification of the intersection of such lines meeting at an acute angle would obviously not be practicable within 1/100 inch. Similarly, features not identifiable upon the ground within close limits are not to be considered as test points within the limits quoted, even though their positions may be scaled closely upon the map. In this class would come timber lines, soil boundaries, etc., etc.

2. Vertical accuracy, as applied to contour maps on all publication scales, shall be such that not more than 10 percent of the elevations tested shall be in error more than one-half the contour interval. In checking elevations taken from the map, the apparent vertical error may be decreased by assuming a horizontal displacement within the permissible horizontal error for a map of that scale.

3. The accuracy of any map may be tested by comparing the positions of points whose locations or elevations are shown upon it with corresponding positions as determined by surveys of a higher accuracy. Tests shall be made by the producing agency, which shall also determine which of its maps are to be tested, and the extent of such testing.

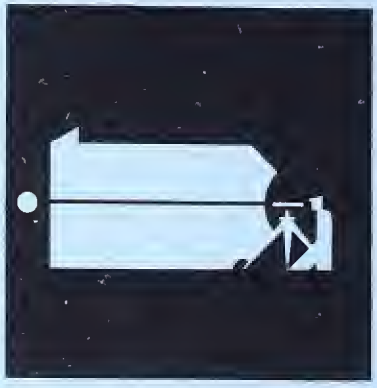
4. Published maps meeting these accuracy requirements shall note this fact in their legends, as follows: "This map complies with the national standard map accuracy requirements".

5. Published maps whose errors exceed those aforestated shall omit from their legends all mention of standard accuracy.

6. When a published map is a considerable enlargement of a map drawing ("manuscript") or of a published map, that fact shall be stated in the legend. For example, "This map is an enlargement of a 1:20,000 scale map drawing," or "This map is an enlargement of a 1:24,000 scale published map".

7. To facilitate ready interchange and use of basic information for map construction among all Federal mapmaking agencies, manuscript maps and published maps, wherever economically feasible and consistent with the uses to which the map is to be put, shall conform to latitude and longitude boundaries, being 15 minutes of latitude and longitude, or 7-1/2 minutes, or 3-3/4 minutes in size.

June 10, 1941.
Revised, April 26, 1943.



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NOVEMBER 1946

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg

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The Outline of a Forest Program for Pennsylvania

1—A continuous and intensified program of research as to the utilization of forest products and the reduction of waste in lumbering and sawmill operations.

2—An increase in the number of Farm Foresters.

3—The organization of local forest-marketing pools.

4—Intensive instruction and publicity as to sound forest practices.

5—The establishment of annual educational camps for farm boys and, if feasible, for adult farm and woodland owners.

6—Increase in the production of the State's tree nurseries.

7—Passage of legislation, if necessary, enabling negotiation of agreements for the planting or replanting of cut-over or other waste land by State-paid labor—all costs to be satisfied by a lien on the future timber crop.

8—Continued enforcement of compulsory planting and stabilization of strippings in coal mine operations.

9—Increased publicity in urban and rural areas as to the dangers and cost of forest fires.

10—Extension of county and community forests.

The Development of Pennsylvania's Forest Resources

The tables and charts published in this issue tell in unmistable terms the story of Pennsylvania's decline as a lumber producing state.

In 1860 we led the Nation in our output of saw timber. By 1870 we had fallen to second place. By 1899, despite the rise in our lumber output in the interval, we stood fourth among the states. After the turn of the century the decline in actual production and relative position was extremely rapid. In 1939 Pennsylvania was the twenty-third state in the Nation in its lumber output, and its actual cutting of saw lumber was less than one-twelfth of that in its greatest productive year in the past.

Employment in lumbering, which reached a high point of 12,687 in 1890, had declined to 3163 by 1940, and the value of our 1940 lumber production was only one-seventh of that in 1900.

While the total employment in timber production is comparatively small, the impact of the decline in our forest resources on the population of counties with large forest areas and no other important natural resources is shown by the chart on page 4 of this issue. In this diagram the growth of the population of eleven Pennsylvania forest counties* since 1870 is

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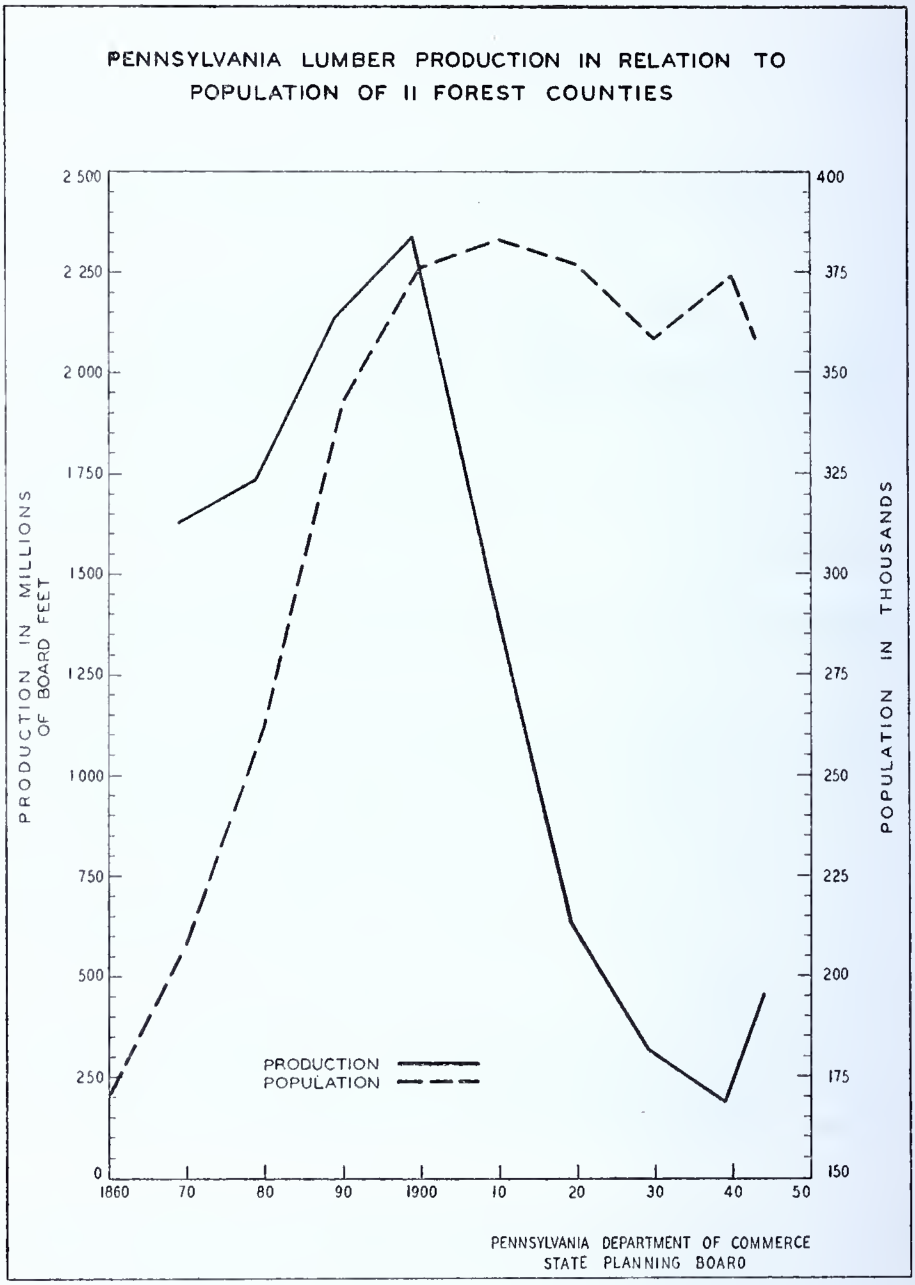
* Cameron, Clearfield, Elk, Forest, Lycoming, Pike, Potter, Sullivan, Tioga, Wayne and Warren.



charted for comparison with Pennsylvania's lumber production. From this chart it is easy to read the story of the relation between the decline of forest resources and the population of that vast extent of timber covered land which comprises more than one-half of the entire area of this Commonwealth.

UNITED STATES AND PENNSYLVANIA LUMBER PRODUCTION—1870-1944

Thousands of Board Feet

	United States	*Pennsylvania*	*Pennsylvania's Rank*	*Percentage of United States*
1870	12,756,000	1,629,000	2	12.8%
1879	18,087,000	1,734,000	2	9.6%
1889	23,842,000	2,133,000	3	8.9%
1899	35,078,000	2,333,000	4	6.7%
1909	44,509,761	1,462,771	14	3.3%
1914	37,346,023	864,710		2.3%
1919	34,552,076	630,471	18	1.8%
1921	26,960,864	368,102		1.4%
1923	37,165,505	361,068		0.97%
1925	38,338,641	330,822		.86%
1927	34,532,420	277,722		.80%
1929	36,886,032	314,250	21	.85%
1931	16,522,643	123,027		.74%
1933	13,961,134	92,591		.66%
1935	19,538,731	157,830		.80%
1937	25,996,857	194,856		.74%
1939	24,975,474	185,684	23	.74%
1944	32,554,000	456,000	21	1.4%

The great timber cuttings in Pennsylvania, which reached their climax between 1890 and 1900, were made necessary by the period of immense industrial growth and urban development beginning at the close of the Civil War and continuing with increased velocity straight through the latter third of the nineteenth century and on to the present day.

Even before that heavy demand had developed, a great portion of Pennsylvania's original forest area had been cut to clear the State's level land for farming.

The peak production of the 90's from the State's timber land was in part made possible by the fact that fifty years ago an enormous acreage of virgin timber still remained in the great forests which were once Penn's Woods. At first thought it might be well concluded that the production of those bonanza years of Pennsylvania's lumbering industries could never again be duplicated. For thousands, perhaps millions of years, a dense forest occupied much of the area which is now the territory of the Keystone State, extending westward into the great Black Forest which clothed both shores of the Ohio Valley—a vast area of primeval woodland so dense that animal life flourished with difficulty in its perpetual shadows.

A tree is like all living things. It goes through the process of growth, maturity and decay. Virgin forests in a state of nature contain a high percentage of trees which have passed maturity and are hollow and decayed. For every species of tree there is a proper age and size at which the greatest possibility of useful growth will be completed, and if Pennsylvania's now existing forest land could be used to produce its maximum crop, and the trees of each species cut at their most useful size and age, the product of that forest would greatly exceed over the course of years the timber which could be cut from a similar area of virgin forest. It is on the basis of this fact that modern forestry practice has been developed. Pennsylvania's position as a great producer of lumber can be restored, and the long-term output of our forest can equal or exceed in future years anything which was ever recorded in the past. Such an achievement would bring with it benefits far exceeding the direct employment provided by stabilized lumbering operations, for it would assure the people of the State continuing employment in timber-using industries, a more regular supply of surface water, a more abundant source of ground water, far greater safety from devastating floods, and the protection of much of our precious top soil from erosion.

Industries Using Wood as a Raw Material

Direct employment in the forest industries and in sawmill and logging camps is only a minor item in the productive work which might be furnished by a continuous timber crop in the Commonwealth.

Industries based on wood as a raw material have had, of late, an astonishing growth. The log cabin of our pioneer ancestors came directly from the forest. The modern house uses a large number of timber products, many of which have been greatly modified in the process of manufacture.

Fifty years ago a timber county could expect to provide only a very limited local employment in processing its own trees into lumber. Today some fifty types of manufacture stem directly from forest products as a raw material, yielding such final consumer goods as plastics, rayon, fibres, wallboards, toys, alcohol, furniture, synthetic rubber, paper and an immense variety of organic chemicals. Much of this variety is due to the use of materials which were once completely wasted.

Timber-producing counties have in the past largely exported most of their lumber as a raw or semi-finished material. If, in the future, they maintain through wise forestry practice a continuous tree crop and utilize that crop as the basis for local industry, exporting to other parts of the State and Nation finished consumer goods, their possibilities for prosperous industrial develpment will be greatly improved.

Pennsylvania's future need for saw timber is likely to be far greater than anything known in the past. Although metals have replaced wood in many of what once were wood's exclusive uses, the demand for wood and wood products has constantly grown.

Wood is a traditional material. It has qualities that are unmatched by metals or by wood substitutes. Wooden furniture and interiors have an intrinsic beauty that can be imitated but never quite duplicated in other substances.

Wood is a non-conductor of heat; it is warm and agreeable to the touch; it is capable of taking on a thousand varieties of grain and texture; it is more easily repaired than most other materials and can be shaped by simple tools; it has a long history of fine craftsmanship in its manufacture. Good woodwork will always be popular.

In addition to numerous domestic and structural uses there are many industrial requirements for which wood is a vital material.

Pennsylvania has the third largest railroad mileage in the United States. To provide ties for its thousands of miles of railroad track will consume the products of a vast area of forest.

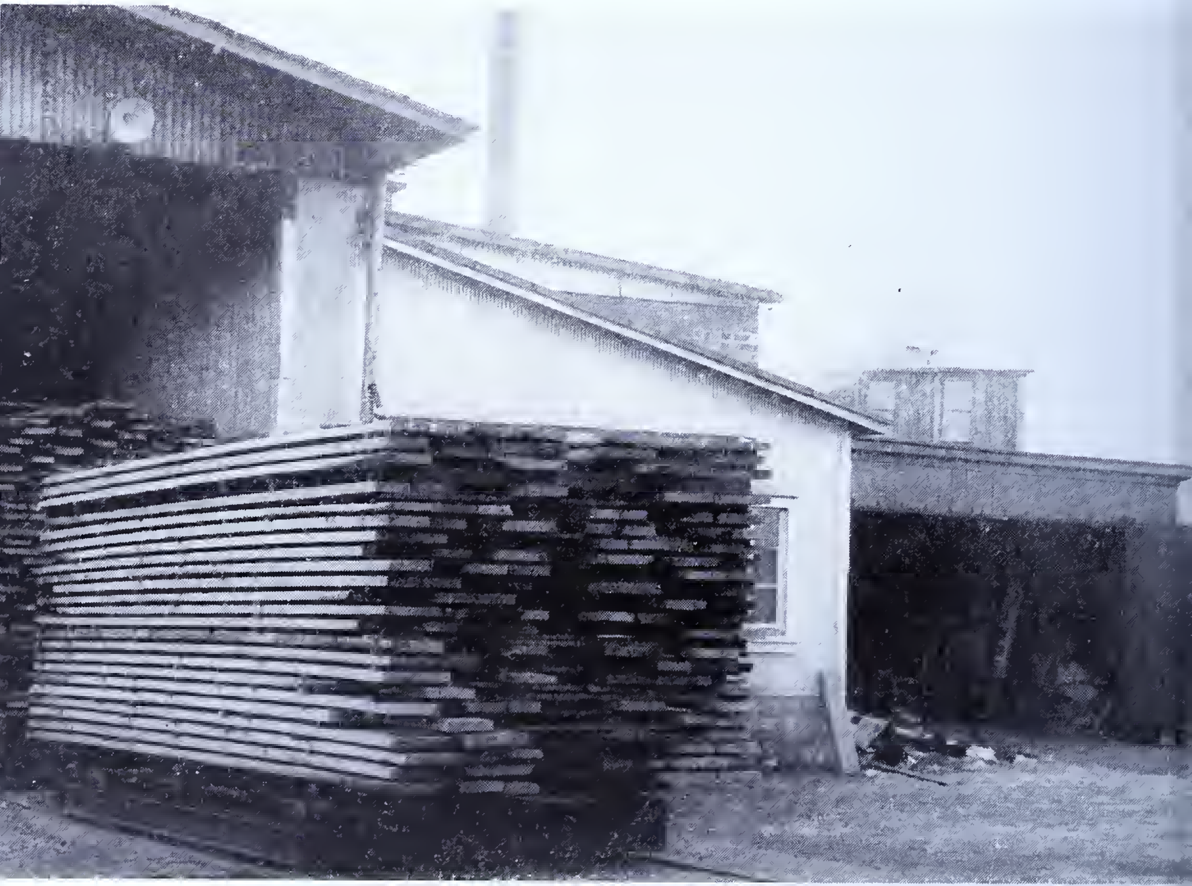
Pennsylvania is the greatest of all coal-mining states. In the anthracite region the mine props needed must be of particularly stiff and pressure-resisting timber. The demand for such timber will continue for hundreds of years. The vast bituminous mines of the western part of the State, much of whose coal resources is still untapped, will require a steady supply of heavy timbers for at least a thousand years.

In addition to all these permanent demands of mines, railroads, and construction, there is the growing need for a supply of wood pulp for the paper mills of one of the greatest publishing and printing states of the Union and for cellulose

Before the turn of the century Pennsylvania was among the first four producers of American lumber.

With modern logging machinery in 1944, the State could produce less than one-fifth of its 1899 lumber output.

There are still mature trees ripe for cutting—-



but Pennsylvania's industries could use much more native timber than is now available.

derived from wood to supply the rayon mills of America's greatest rayon-producing Commonwealth.

Pennsylvania's present forest output is inadequate to supply the State's immediate needs for mine props, railroad ties, wood pulp, and structural timber, and it is evident that the growing demand now existing for wood as a basis for industrial enterprise insures the future market of all the timber Pennsylvania can grow with the most advanced forestry practices for many generations in the future. Of no other raw material can this so certainly be said.

There is no product and no crop whose future is more assured than that of our State's forests; none more useable at the point of production; none which can lead so easily to the expansion of local industry and the employment of local labor in its re-manufacture.

New Uses for Wood and Wood Products

A brief summary of the advances made in the uses of wood will make clear to the people of the State's forest counties and to all of our 169,000 farm operators the importance of developing our supply of the one basic industrial raw material over whose future man has complete control.

Improvements in the properties of wood

War shortages in metals have forced an unprecedented development in the use of wood as a building material. Some of these uses will not withstand future competition from metals. Recent developments have, however, so improved the inherent advantages of wood, such as its relatively low cost, ease of fabrication, high strength-to-weight ratio, and beauty of finish that there is little doubt that wood has a wider potential market than ever before.

Many former disadvantages of wood can now be greatly reduced or eliminated. Many new opportunities for its use are now available.

Chemical impregnation of wood can assure its resistance to moisture, insects, fungus and even fire. This removes some of the most serious disadvantages in the use of wood for buildings and exposed structures.

New methods in drying and seasoning wood have not only improved its properties but have made possible greater savings in time and equipment.

Advances made in standardized grading of lumber have reduced many former uncertainties to the consumer.

New methods for joining structural members have been devised which overcome the former difficulty of obtaining full strength at the joints.

The lamination of wood to form large structural members has achieved a new importance through developments in the chemistry of waterproof glues. It is particularly significant that this technique permits the use of short lengths which otherwise would be wasted.

Plywood is perhaps the most outstanding development in wood as a construction material. Large sheets, resistant to moisture, warping, shrinkage and cracking, in addition to having a high strength-to-weight ratio, are revolutionizing building construction methods as well as architectural design. Concrete forms, wall paneling, flooring, doors and built-in furniture are only a few of the many uses of plywood in modern construction.

Of particular interest to Pennsylvania is the fact that new developments in machinery for making plywood no longer make it essential to depend entirely upon the large "peeler logs." Smaller logs which are more available in this State can be used with a correspondingly reduced amount of waste.

Plywood in its various forms has made possible an even more revolutionary use of wood in other fields.

Preformed plywood. The bonding of thin layers of wood to conform to curved surfaces now makes possible the use of wood in shapes that previously could be formed only from metal.

A high strength-to-weight ratio and resistance to corrosion makes preformed plywood particularly adaptable to airplane construction. The now famous "Mosquito Bomber"—one of the fastest of planes—is constructed of plywood, as also is the largest plane in the world—"The Hercules"—now nearing completion. Gliders and private planes are also being built of this material.

At first the fabrication of preformed plywood required an expensive and short-lived steam pressure bag. More recently the costs have been greatly lowered by using a much simpler and cheaper technique which applies the heat necessary for bonding through the use of high-frequency radio waves.

Impregnation of wood with plastic resins is still another development that has radically enlarged the field of usefulness. By impregnating wood, plywood, or preformed plywood with plastic resins, a new material is created which has a hardness that approaches that of metal. Strong and rigid, this material has a surface that resists abrasion, denting and the action of strong chemicals. Impregnation of wood permits unlimited possibilities in either natural or colored finishes. Because the surfacing penetrates throughout the material, sanding, rubbing and polishing are all that is necessary in removing surface damage.

Another important quality is flexibility before the impregnating material has hardened. Strips of wood can be bent and twisted like soft metal and after hardening will remain in any position.

Boats, washbasins, bathtubs, flooring, furniture, counters, and tubing are only a few of the many uses for this new material that originates in the forest.

Compregnation of wood is a still further development that brings even greater strength to wood. By impregnating wood —laminated or otherwise—and subjecting it to heavy pressures, the density of the wood can be increased many times. The over-all strength is increased, and it is possible still further to increase strength where stress demands it. A compregnated propeller blade for airplanes, for example, can have additional strength to take care of the severe stresses at its base, while the weight and strength of the blade can be decreased toward the tip according to the changing need.

Through the use of new adhesives wood can now be permanently bonded to metal sheets. This opens a new field of usefulness through the creation of a material which has the rigidity and lightness of wood and the harder surface of a metal.

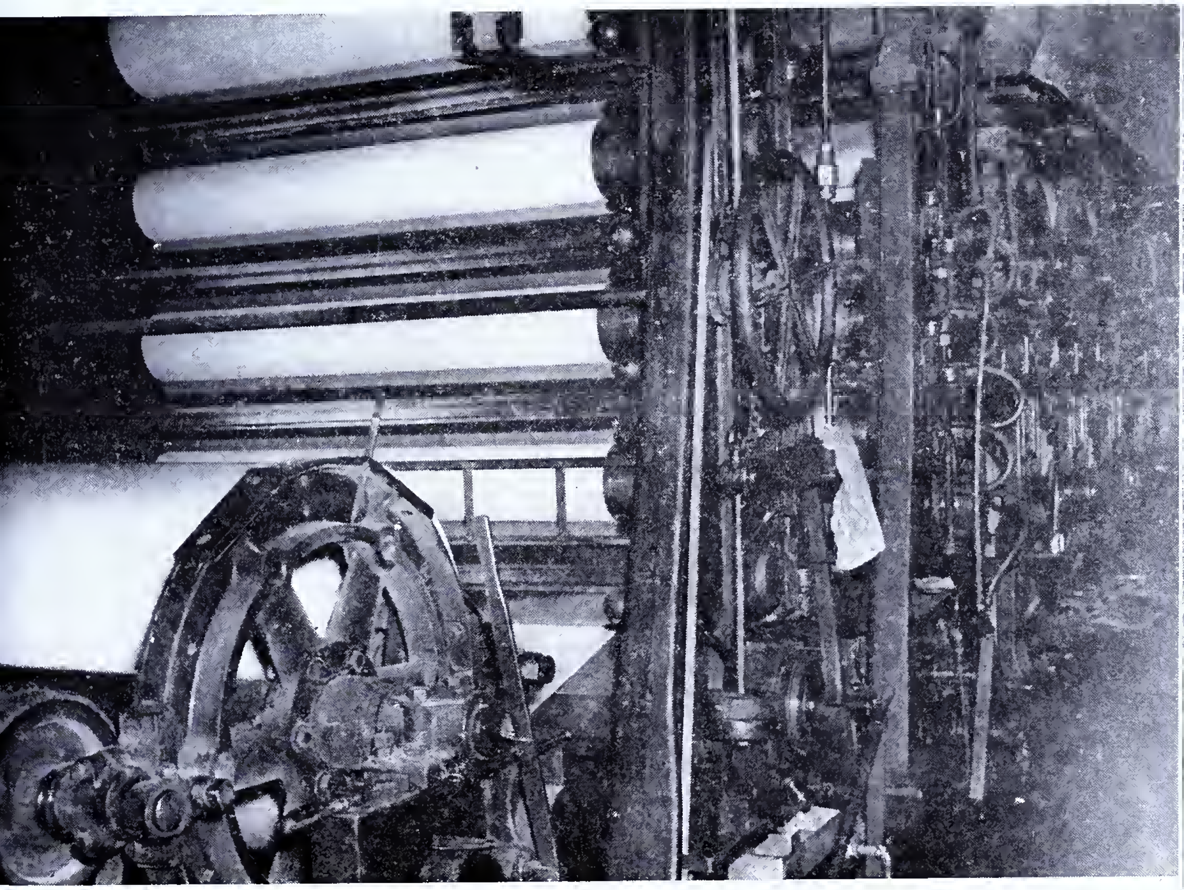
Another unusual application of wood has been in the development by a Pennsylvania manufacturer of a wooden harp frame for pianos, which, it is claimed, excels the conventional metal frame in resonance and saves over a hundred pounds of weight in a small instrument.

Conversion of Wood

Thus far wood has been considered only in those forms which utilize its natural structure either alone or in combination with plastic resins.

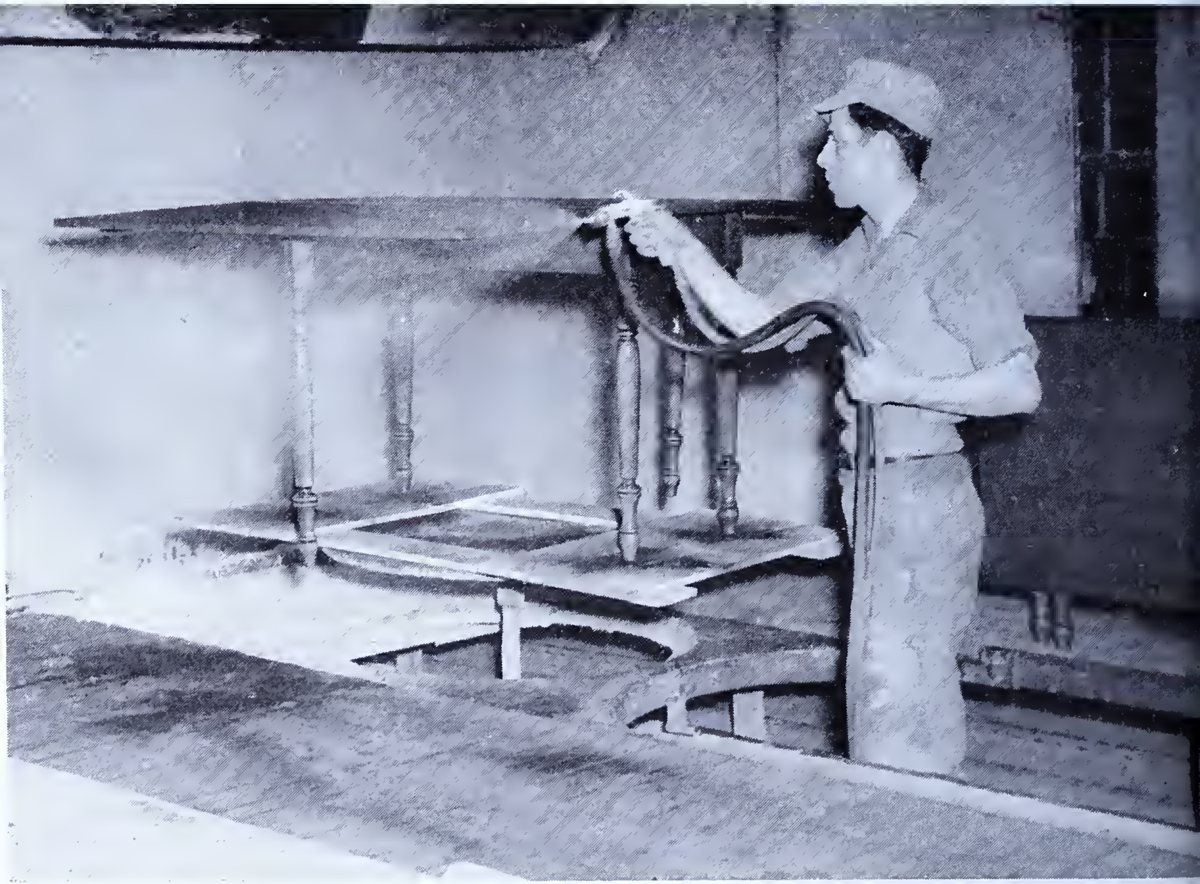
Paper, cardboard, insulating board and many forms of rigid wallboard are derived from wood and wood waste. Other products that depend upon the felting of wood fibres, such as insulating, acoustical and hard pressed wallboard, are in great demand. New technical developments are achieving still greater resistance to moisture, improved insulating or sound-deadening properties, and more attractive or harder surfaces, which in turn open new opportunities for use.

A great printing and publishing State still supplies pulpwood



for its many paper plants, but must import more than it grows.

Pennsylvania woodlands could furnish raw material for many new industries



and provide local employment throughout our forested area.

The increased use of **paper** for printing, wrappers, containers and cleansing tissues is making greater demands upon our timber resources. Indicative of new markets is the growing popularity of waterproof paper containers for liquids such as milk, which eliminate the collection, cleansing and sterilization of bottles. In Pennsylvania, in spite of the vast acreage of forest land, it is necessary to import over half of the pulpwood and pulp that is used by the State's paper industries which, in 1944, employed 14,000 workers with products valued at approximately $151,000,000.

Two methods of producing wood pulp through chemical action are now in common use—the sulphite method in which ground barked wood is digested in a solution of acid sulphites, and the sulphate and the soda methods in which the ground wood is digested in an alkaline solution. In both processes the pulp must be bleached for the manufacture of writing paper, printing paper and the like. In its unbleached state it is used for the making of wrapping paper, bag paper, and in the manufacture of tissues and cardboard boxes.

Paper making from wood is possible because cellulose molecules which have a chain or thread-like form can be bound and matted together to form thin durable sheets, when rolled under pressure.

The waste products of paper making contain valuable chemical compounds. In the sulphite process the waste lye contains a certain percentage of sugar, chiefly from the breakdown of hemicellulose which forms approximately 27% of the wood pulp. This sugar content can be fermented into alcohol. In countries such as Sweden, lacking in other important sources of chemical raw materials, sulphite alcohol when treated with chlorine yields important glycol products which are employed in anti-freeze mixtures, in the manufacture of gelatinous dynamite and as a basis for synthetic rubber.

Chemical Conversion of Wood

The most startling developments in the use of forest products are found in the chemical field. The variety of materials that can be derived from wood is almost limitless. Although some of these products have been familiar to the public for many years, others are just coming into widespread use. Many more still await further technical development or favorable competitive conditions and depletion of other resources, before they become important factors in the productive capacity of the State.

Plastics from Wood

The two major constituents of wood fibre, cellulose and lignin, have each given rise to a series of plastic substances, some of which are already of very great commercial importance.

Cellulose which may be obtained from wood waste and sawdust is the basis of the first commercial plastic, celluloid or cellulose nitrate, which is extensively used for photographic film, as an artificial ivory, and in the composition of lacquers and protective coatings.

Cellulose acetate, a much less inflammable product, is of widespread use in the manufacture of safety film for moving picture cameras, and of lacquers, plastics and acetate rayon. These cellulose plastics are commercially important because of the bright color combinations possible in their use, and they are also largely employed in the manufacture of transparent containers for packaging.

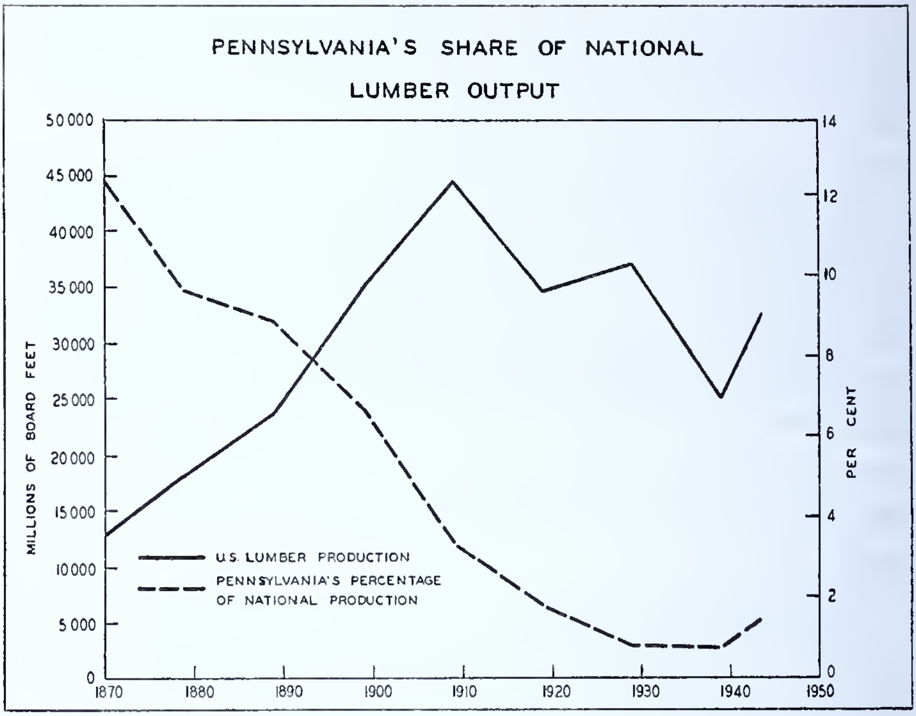
Molding compounds from which slabs, boxes, and optical goods are made have been developed from both cellulose nitrate and cellulose acetate. These compounds are available in a wide variety of properties.

Ethyl-cellulose, another plastic material produced by the etherification of cellulose, is much employed in forming plastic objects by extrusion. It has valuable electrical insulating properties, and is also useful in the manufacture of articles which must resist the action of alkalies.

Lignin which forms 25% to 30% of most wood fibres is proving valuable as a base for thermosetting plastics, lower in cost than somewhat similar substances derived from phenol. Wood chips and sawdust are generally used as the raw material from which the lignin plastics are derived, but the waste of paper and pulp mills is also an important source. The two series of plastic substances originating from the cellulose and lignin in wood will undoubtedly prove of increasing future value.

The following list indicates the range of products that can be obtained from our forests through physical and chemical alteration of wood fibres:

artificial wool
celanese silk
sugar
vinyl silk
molasses
yeast
fertilizer
rayon
artificial leather
plastics
cellophane
celluloid
perfumes
aromatic oils
solvents
tannins for leather
dye stuffs
glycol
vinegar
cattle fodder
chicken feed
oxalic acid
insecticides
acetic acid
methanol
formic acid
ethyl alcohol
adhesives
explosives
soaps
phenol
motor fuels
lubricants
paints
varnishes
lacquers

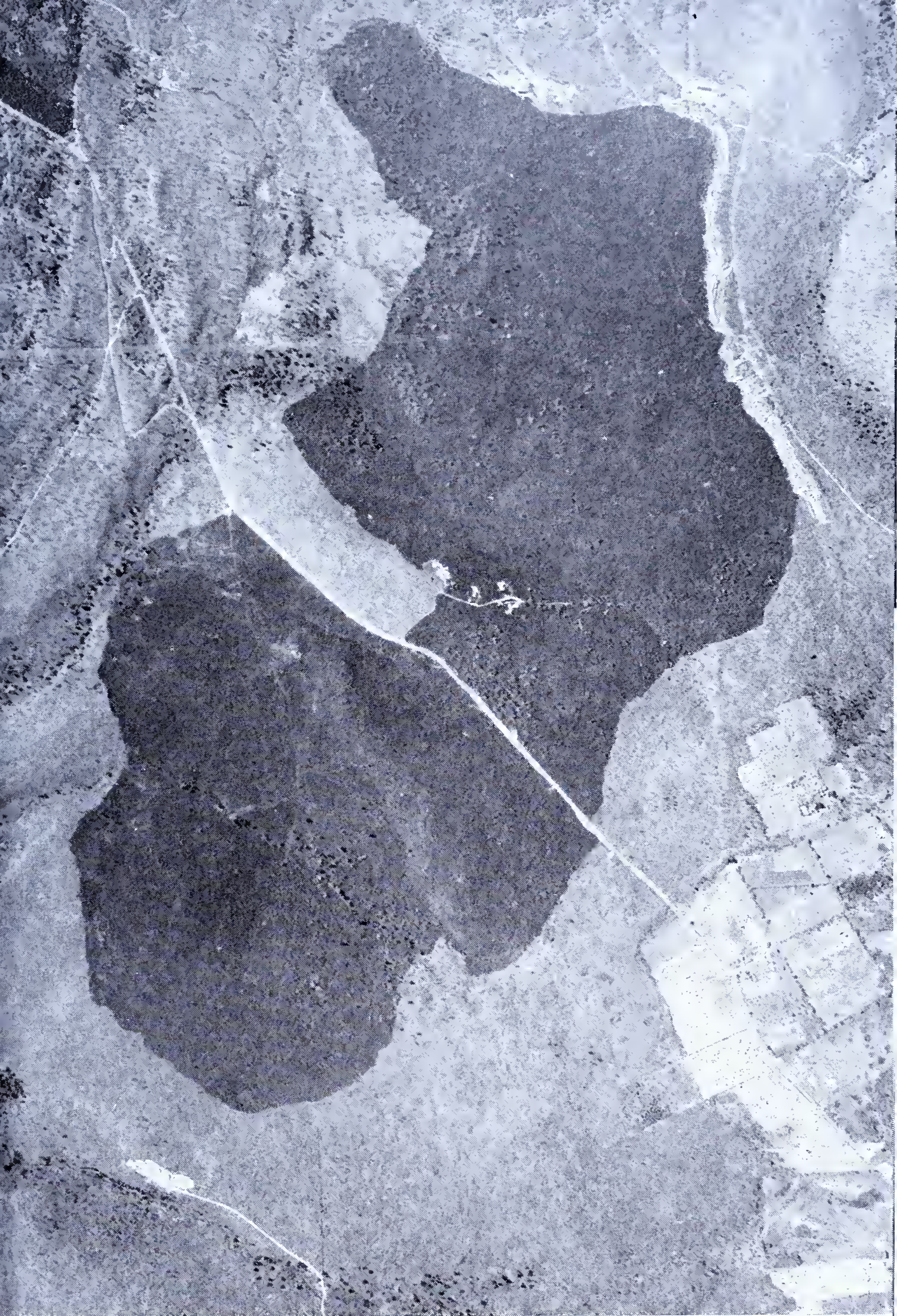

PENNSYLVANIA'S SHARE OF NATIONAL LUMBER OUTPUT

PENNSYLVANIA DEPARTMENT OF COMMERCE STATE PLANNING BOARD

The Basis for a Forest Program

Much more could be said in regard to the future need for Pennsylvania's timber resources, but the matter of first importance to the Commonwealth today is that of securing an adequate supply of forest products.

How can our existing resources be developed to a point where Pennsylvania's forest lands will supply at least the needs of Pennsylvania's industries and provide furniture and construction material for Pennsylvania's homes? That is no easy problem, because timber is a slow-growing crop. Its production on a continuous yield basis often involves planning over a period longer than the average human life.



From 15,000 feet—This dark blot on Pennsylvania hills is the destructive track of a recent forest fire.

An unextinguished camp fire, a carelessly tossed match, a spark from a passing train—

and in a matter of minutes a green hillside becomes a roaring furnace—

destroying the growth of half a century, burning humus and forest duff accumulated over thousands of years—

leaving behind a scene of utter desolation.

Our forests' enemies are many. The gypsy moth strips trees to the bare boughs.

Large areas must be dusted with DDT every spring.

Except for the first stripper of an area of virgin forest, quick returns on the investment of money and labor in a forest project cannot be expected. Despite this fact, which runs so counter to that psychology of quick profits which has devastated so much of America's magnificent forest stand, a growing number of lumber companies, of farmers, of municipal and state governments and endowed institutions have now embarked on long-term programs for the improvement of existing forest stands and the development of a continuous crop of timber on their holdings. They have done this because such a procedure offers large opportunity for eventual profit and elevates the lumber industry from a fly-by-night enterprise to a solid and continuous business of assured stability.

The Protection of Existing Forest Resources

The first step in any program for the development of a continuous and adequate timber crop is a more intensive program for fire prevention and control, and increased support for State and Federal agencies which are waging a constant war against the many insects, parasites and diseases which attack our native trees.

Both fire and forest pests are largely the creatures of civilization, and they are both terribly destructive. A forest area larger than the State of Pennsylvania is burned over every year in the United States, and much but not all of that loss is preventable.

In 1936 timber equivalent to 1,390,373,000 board feet was destroyed by fire in the United States, and 3,973,930,000 board feet were destroyed by insects, drought, wind, and disease—a total of more than 5 1/3 billion board feet as compared with a cut of 47,808,000,000 in that year. That the United States forests are not growing rapidly enough to stand an annual loss of that dimension is evidenced by the steady decline in lumber production since 1910 and by the increasing imports of paper and pulpwood from foreign sources.

Lightning is the one unpreventable cause of forest fires. The only remedy for that summer danger is the constant watchfulness of State and National fire wardens.

Slash burning and the re-burning of cut-over areas have caused many disastrous fires, and in some areas of Pennsylvania have made the natural re-stocking of cut-over land in our forests practically impossible until such burnings are checked. Fortunately we have not been visited by a fire in this State so disastrous as the Tillamook fire of 1933 in Oregon which destroyed enough virgin timber to equal the entire 1932 lumber cut of the United States. This fire was caused by lightning igniting the slash left after a lumbering operation.

Pennsylvania's progress in fire prevention and control has been highly creditable. Between 1921 and 1931 the average area burned over in the State each year was 182,302 acres. During those years the State spent approximately $344,000 a year in fire prevention and control—an expenditure of 2-6/10 cents per estimated acre of forest land. Between 1931 and 1941 the average expenditure per year had decreased to $297,000 which was less than 2 cents per acre, and the average annual fire area had been reduced to 71,739 acres. In the last five years the average burned area was less than 60,000 acres with an expenditure of $260,000 a year.

In 1944, 375 of the State's 1743 forest fires were caused by sparks from railroad engines, 345 by smokers, 344 by campers, 173 by the burning of debris and slash, 117 were incendiary, which includes the burning of scrub land by berry pickers, 11 were caused by lightning, and 391 were classified as miscellaneous or of unknown origin. That the total for that year represented a record of achievement for the State's fire prevention services is shown by the fact that New York State with 11,000,000 acres of forest land as compared with Pennsylvania's more than 15,000,000 acres, had 2558 fires in that same year, and Massachusetts with only 3,500,000 acres had 2474 fires.

The State possesses 150 forest fire towers of which some 140 are manned during the fire season, necessitating the maintenance of 800 miles of telephone wire. Eighty per cent of our forest fire towers are also equipped with two-way radio communication. Two thousand fire crews have been organized in the State with a personnel of 30,000 men and women who have volunteered for this service, but who are paid whenever called on for active duty of fire fighting in the woods.

It is estimated by the Federal Government that for complete protection to Pennsylvania's forest land an annual expenditure of $498,000 would be necessary. How necessary one may be convinced by the facts already mentioned in this survey. Despite the efforts of the State forest protection service which has reduced the annual area burned to less than 1/3 of its former figure over the past twenty-five years, the total area of woodland burned over in Pennsylvania since 1921 is 2,830,050 acres, which represents 18½% of the State's total forest stand. Though there is some duplication in this total due to the fact that some areas have been burned over a number of times in the past twenty-five years, it is also probably true that the total number of actual fires, especially in the earlier years, considerably exceeded the number reported to the Forest Service.

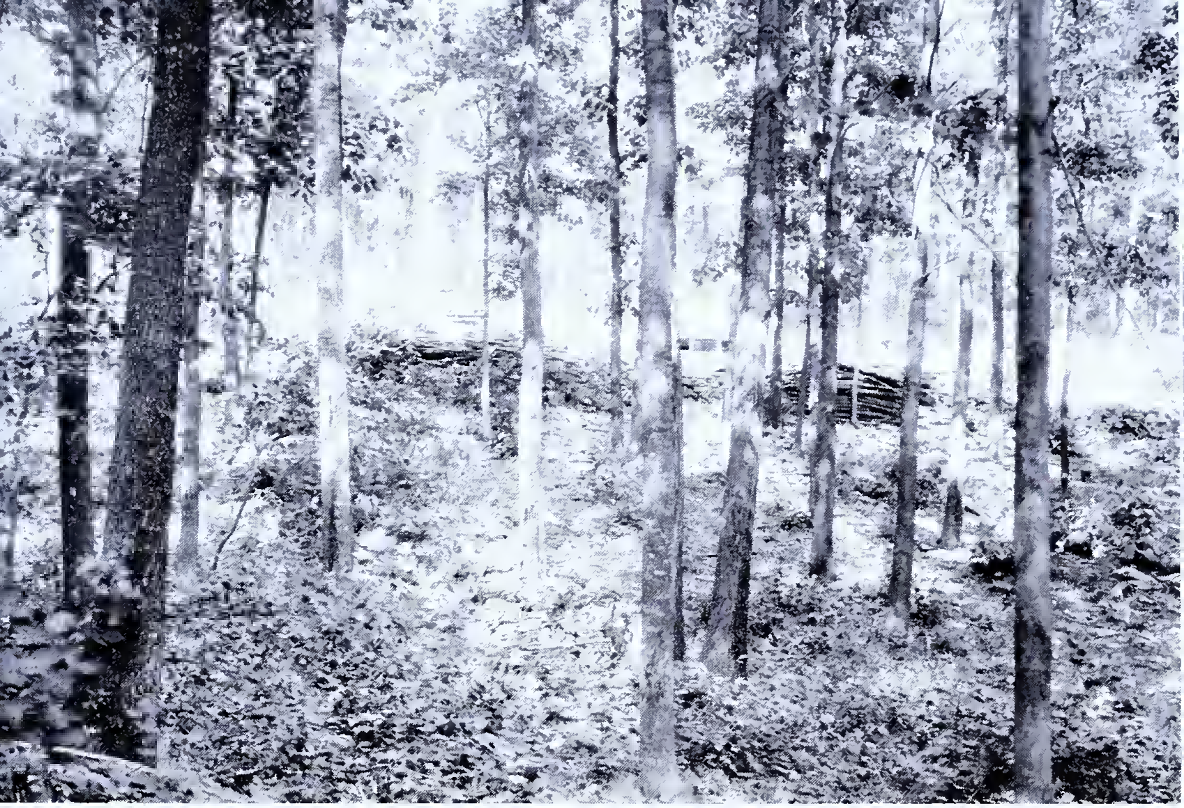
It is obvious, however, that no measures for the prevention or extinguishing of forest fires can be adequate to cope with these losses without a full realization on the part of all our own people and all our visitors as to the importance of the State's forests to our present welfare and future prosperity. A constant campaign of education on the dangers of unextinguished camp fires, of matches and cigarettes tossed from motor car windows, and on the careless burning of brush must be maintained through the public schools, the State motor clubs and all public agencies, if these needless losses are to be prevented. Effective precautions against sparks from railroad locomotives would remove the largest single cause of forest fires.

To such great inroads on our timber reserves must be added substantial and potentially serious losses from the ravages of insect life and plant diseases. The gypsy moth, the white pine blister rust, the Dutch elm tree disease, and the chestnut blight are enemies of the forest fully as dangerous, though not so spectacular, as fire. Efforts for the control of these and other destructive forms of insect and fungus life cannot, like fire prevention, be conducted through State activity alone.

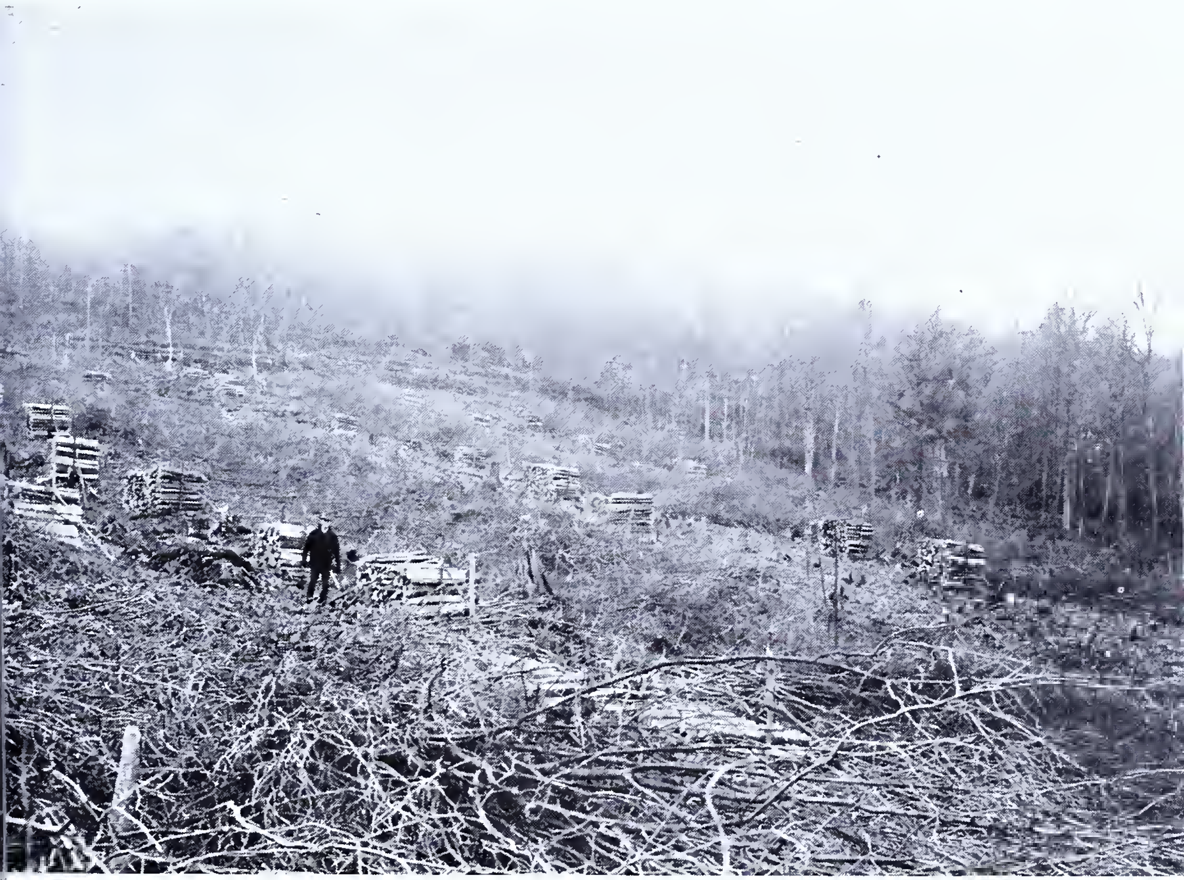
The chestnut blight starting in the city of Brooklyn from imported trees has spread over almost the entire territory of the United States, and since 1904 has practically eliminated the American native chestnut, once one of our most valuable forest trees.

Beginning in 1932 the Bureau of Plant Industry of the Pennsylvania Department of Agriculture, in co-operation with the United States Department of Agriculture, has been actively engaged in a campaign to prevent the spread of the gypsy moth, which has for many years caused serious destruction in the forests of the northeastern states. The caterpillars of this moth feed on the leaves of birch, oak and linden trees, and when they are present in large numbers even attack stands of evergreens. In heavily infested areas many trees are killed by these insects.

The first known discovery of the gypsy moth in Pennsylvania was made in 1932. Specimens collected by a student of The Pennsylvania State College that year were identified by the College entomologist, and it was discovered by State and Federal authorities that a considerable forest area in Luzerne County was being devastated by attacks of this caterpillar. Since that year the fight has continued through the growing season of each succeeding year—at first through the expensive and laborious method of hand or machine spraying of trees throughout the infested section of the State, and finally through the use of



Managed cutting allows trees to reach their greatest value.



Clear-cutting takes young trees as well as old.

A well managed farm wood lot is a continuous benefit to its owner—

One over-cut or neglected provides no income or protection.

a DDT spray laid down by airplane. Many tons of powerful insect poison are now used in the forests of the Lackawanna-Luzerne area every year by the State Bureau of Plant Industry, and the new technique is showing gratifying results. Sections of Lackawanna and Luzerne forests which had once been heavily infested were found to be completely clear of living gypsy moth larva after the spraying of 1945, and it is now believed that continued efforts along these lines can eliminate the danger of the gypsy moth spreading across the Commonwealth, and can do so without noticeable harm to bird life or to fish and game.

Expensive research is often necessary before the proper biological or chemical enemy of new parasites can be discovered. Such research is properly the function of the Federal Government in co-operation with State authorities.

Full Utilization of Existing Resources

Adequate protection of the State's forests from fire and the ravages of insects and diseases is but one step in the program necessary for the full development of the potential resources of Pennsylvania's 15,000,000 woodland acres. Since trees grow slowly such a program must have a long-term and a short-term aspect. Over the long-term we may hope to introduce such measures as will encourage the reforestation of all the State's lands best suited to a forest crop and the gradual development of a growth capacity sufficient to meet all the State's future lumber needs and to provide material for export. For the immediate future, and for a good many years to come, we are facing the necessity of making a full utilization of all our existing forest resources through the best possible use of the tree crops now coming to maturity.

Those existing trees are steadily increasing in value. Pennsylvania's hardwoods and softwoods are located on lands close to the points of greatest national demand for forest products. Their future market is assured.

Three things can be done with an existing stand of forest trees. It can be left in a natural state, it can be cut indiscriminately to remove all useable material without regard for the future of the stand, or it can be cut wisely under approved forestry practices as trees mature, or need removal for improvement of the remaining crop.

If a forest tract is not interfered with by man, the trees, once they have passed maturity, decay, die and fall one by one and at length sink back into the forest floor. This is the natural process of ageing. There is abundant justification for maintaining certain tracts under public ownership in a state of nature as living memorials of Pennsylvania's primeval forests, but even in such areas forest care and tree protection are necessary, since overmature trees are subject to drought, windfall, and insect attacks that may result in a considerable decrease in the aesthetic value of the forest preserve.

The dense shadows of a primeval forest are unfavorable to both plant and animal life. Few saplings can survive in its continuous twilight. Except for openings caused by the death of ageing trees, there is little or no browse or cover for game, and such areas in a natural state are but sparsely inhabited by wildlife.

When the pioneers attempted to carve out homes for themselves in the wilderness, they cleared the land completely, cutting down every tree, burning both timber and brush and destroying, of necessity, much of the age-old humus in the forest ground. That method of cutting became a national habit. It is the method by which Pennsylvania's coal mines provided themselves with mine props, laggings, sprags, and the ties necessary for the production of the great wealth of anthracite and bituminous coal which lay under the fertile soil of Pennsylvania. That coal was worth more in mere dollars and incalculably more in the satisfaction of human need than all the gold mined in the history of the world, but its production has taken a terrific toll of Pennsylvania's forests.

Since the coal mines demanded immense quantities of all sizes of timber from saw logs to mere poles, clear-cutting became an established practice in the forested areas surrounding our bituminous and anthracite fields. That practice continues to this day, but fortunately more and more of our forest owners are recognizing the losses and waste involved. Clear-cutting as commonly practiced removes all trees except worthless snags and a few saplings, leaving behind stumps and a brush composed of sprouts, seedlings, and various small trees and bushes. If a large area of that material is burned and seed trees are absent, as they most frequently are on large clear-cut areas, the land is often reduced to a worthless scrub, and if on any considerable slope, the tract is sooner or later gullied and scoured to the bare rocks by erosion.

Indiscriminate and uncontrolled clear-cutting followed by fire reduces a forest to waste land. Such clear-cutting at its best, without any subsequent fire, leaves behind a forest that will be of no value as a producer of wood for many years, and is frequently a breeding place for destructive insects and fungi. Moreover, such a method of cutting has little to offer in the way of discrimination between the fine qualities of the American native trees. The useful varieties of oaks and pines, the sugar maples, hickorys, and hemlocks—the trees filling special and important needs and of growing value in the complex demands of modern life—trees, best for furniture, stoutest for beams, most enduring in the weather, toughest and most elastic for the handles of axes and plows are frequently cut down in the period of early growth and used only for lagging or fence posts, while important future possibilities are completely lost.

Since different species of trees mature at various ages and dimensions and grow constantly in value up to the year of maturity, unregulated clear-cutting is the most wasteful way of utilizing a forest.

Contractors for pulp mills and mines have in the past been particularly shortsighted in adopting this practice. As a consequence many of them must now reach out to more and more distant sources for their supply of raw material. In the pursuit of quick profits both forest owner and wood user have lost over the long-term in lowered land values and higher transportation costs.

Leading railroads in Pennsylvania must now buy more ties off their lines than on their lines.

Many of the State's largest coal producers must import mine timbers from other states despite the fact that their operations are conducted in what once were heavily forested areas.

Clear-cutting, in itself, is not the root of all evil in overcutting of our forests. It is the careless or improper use of clear-cutting that leaves forest land a barren waste in its wake. Most particularly, it is clear-cutting followed by uncontrolled fire that destroys all timber value. Clear-cutting as a technical forestry measure has been used extensively in Europe; and in this country it may be properly recommended for certain types and conditions of forest stands. When clear-cutting is practiced in forestry, however, definite provisions are made for natural reproduction of valuable trees; or artificial reproduction is carried out. Some examples of conditions, where this method has been recommended, are as follows: in mature stands of Jack pine where abundant seed is present in slash and trees left after partial cutting are easily blown down; in scrub pine stands where seeds will blow in from surrounding uncut areas; and in over-mature hardwood stands of mainly inferior species where clear-cutting will favor desired species. The use of clear-cutting as a general practice in hardwood stands of Pennsylvania, however, certainly represents a serious economic loss.

Some form of partial cutting is the approved and scientific method of obtaining full value and usefulness from an existing woodland area. It is based on a century-long study of the

Leaving seed trees guarantees a new crop.

On lands left bare by cutting or burning, nothing comes up but bushes or scrub oak.

In a Pennsylvania Virgin Forest. One of the few remaining stands of the great trees that once covered 28,000,000 acres of Pennsylvania's soil.

economics and biology of forest trees. It requires more care and forethought, but yields far more eventual profits and provides a steady and perpetual supply of timber. It is the method of forest harvesting which the State and Nation must encourage by every available agency of education and assistance. It uses trees at their period of maximum usefulness and value as to both size and species, and with proper co-operation among owners of smaller forest holdings, it can be successfully applied to the farm wood lot.

One important means for the accomplishment of this end is the extension of the practice among sawmill operators of buying trees in a timber tract or wood lot on a board foot basis. Such a method of purchase encourages selective cutting, assures the wood lot owner of a countinuing profit from his trees, and the sawmill operator of a continuing supply of timber.

There is little doubt that by the use of approved forest practices and the replanting of land not suited to agriculture, the State's forests can produce the bulk of the crop needed for its pulp mills, railroads, coal mines, and all its other wood-using industries, and that such industries could be very considerably expanded on the basis of Pennsylvania's own forest trees.

The problems of conservation can be solved either by drastic regulations imposed by Federal or State government after the fashion of prewar Italy or Germany, or by methods which preserve American ideals of free enterprise and make their appeal to enlightened self-interest and to those principles of good citizenship which have served us in the past to attain a leading place in the Nation's industrial life. Such a program would operate on the principle that only where a man's neglect or misuse of his own possessions directly endangers the general welfare or interferes with the rights of his neighbors can there be any solid grounds for governmental intervention. Yet it must also be based on the duty of the government of the Commonwealth of Pennsylvania and of all its civil divisions to co-operate with their citizens in working out a sound program of forest development profitable to the individual and at the same time providing assurances as to the future welfare of the State.

One useful form such co-operation can take on the local level is the establishment of more community forests than now exist in the Commonwealth. As early as 1909 such projects were authorized by the General Assembly. Later laws have extended the power of all types of civil division, including the counties, to acquire land to be devoted to forest growth and forestry practices.

In a number of our States the development of such forests has long been an important activity of local government. In Wisconsin nearly 2,000,000 acres of forest land are owned and operated for profit by the communities and the school districts. While there are more than 130 such forests in Pennsylvania, comprising over 80,000 acres of forest land, the widespread planting of community forests would have many advantages to the people of the State.

Such woodland tracts serve as a protection for watershed areas. They provide insurance aaginst erosion and floods. They offer the possibility of converting unprofitable waste or tax delinquent land to a community asset through the future sale of the timber crop on a selective basis. They add to the attractiveness of the community and the State and to our recreational and wild life resources.

Scientific forest management of community timber land under the direction of the Pennsylvania Department of Forests and Waters would also provide an important means for the study of conservation in our public schools and would serve to impress upon the people of the State the economic importance of Pennsylvania's forests.

A Program for the Development of Pennsylvania's Forest Resources

1. The Encouragement of a Better and More Profitable Use of Existing Resources

The first item in a State program for the improvement of our forest resources must be the development of means to insure a better and more profitable use of existing timber resources in the Commonwealth. This implies:

> The full utilization of the waste products of lumbering, sawmills, and other forest industries.
>
> Managed cutting to improve the growth of existing stands and make the most profitable use of each variety and dimension of forest tree.
>
> Making available for profit of both owner and industry the important timber resources in small holdings and farm wood lots throughout the Commonwealth.

Since the increase of forest acreage by any considerable additions to existing timber stands in the Commonwealth will be a matter of gradual development, the first important consideration in a sound forest program is to use what we now have to the best advantage while we are engaged in the process of increasing our ultimate resources.

Every year, in Pennsylvania, forest material of industrial importance is wasted or burned due either to lack of knowledge as to its industrial worth, a lack of adequate facilities for research in forest chemistry and its industrial applications, or to a lack of proper organization for the pooling, sale, and use of such waste products.

To these or allied causes must be attributed the wasteful clear-cutting of small or large timber tracts and the failure of many farm owners to utilize their trees as a source of continuous profit in farming operations while maintaining an adequate wood supply for their own domestic use.

The remedy for these conditions is twofold. Research as to utilization of wood products requires a larger share of public support than it has commanded in the past. The result of such research should be translated into simple and understandable language and circulated among all forest owners in the Commonwealth. Research and publicity are necessary in correcting the existing problems of forest waste. Included in the field of such research is also the improvement of saw mill machinery and the encouragement of practices which will improve the quality of our raw and seasoned lumber supply and minimize cutting wastes.

With many million acres of privately owned forest land the State requires the services of an increased force of Farm Foresters to advise timber owners and the owners of farm wood lots as to the advantage of managed cutting of their timber crop, to organize groups or pools of farm and other small timber owners, and to assist in the marking and marketing of trees so that lumberers or saw mill operators can find it profitable to cut out matured timber from small holdings in a quantity adequate to make the operation commercially feasible. If this is done, the farmer or other small owner will improve the growth of his younger trees and find himself able to dispose of his matured trees at a reasonable profit and with a minimum interruption to his other labors. He will find the farm wood lot a profitable part of his establishment and be able to regard it as a permanent resource to be further developed. That this is important to our forest economy is shown by the estimate of the U. S. Forest Service that one-third of our national forest products comes from farm wood lots, but that two-thirds of the output from wood lots is in low grade and low value products.

By organizing the co-operative local marketing of trees and waste products and, where necessary, conducting local demonstrations in the marking of trees for cutting, the Farm Forester could become an important influence in encouraging a further growth of timber and improving our existing stands for future use. The number of such Farm Foresters needed would depend on the type of holdings in each of the forested regions of the State, but it would need to be considerably increased over the present number, which is wholly inadequate considering the importance of this work and the contribution it can make to the prosperity and resources of the Commonwealth.

2. Instruction in Improved Forestry Practices

Parallel with these activities there is necessary a program of instruction in improved forestry practices which will command the attention of all of Pennsylvania's farmers and timber owners. It is not likely that such a program could be successfully conducted by Farm Foresters unaided by other services and by statewide publicity.

The protection of existing woodlands from fire, the proper methods of cutting and of bedding down the slash of lumbering operations, the methods and standards to be applied in selective cutting, the type of trees most desirable for planting, and the whole technique of replanting in existing forest stands and on waste land should be the basis of well publicized and widely circulated correspondence courses conducted by the Department of Forestry of The Pennsylvania State College in co-operation with the Pennsylvania Department of Forests and Waters, the Department of Agriculture, the State Planning Board and other public agencies. One course in Farm Forestry is now available as a free service of the School of Agriculture of The Pennsylvania State College. It is probable that the present importance of the subject justifies other parallel courses in general forestry practices for the use of owners of woodland areas. Such courses should be publicized and brought to the attention of all farmers and woodland owners in the Commonwealth.

The Farm Foresters and other members of the Forestry Service in the field could assist in the demonstration of approved forestry practices and from time to time meet with the woodland owners in their area to discuss particular local problems.

Since, of all citizens of the Commonwealth, farm boys and girls are most concerned in the future of our forests and can live to see the results of their labor translated into mature trees, there should be conducted in the State Forests of Pennsylvania an annual Forestry Camp or a series of such camps for members of 4-H Clubs and selected students from the State's secondary schools, where intensive training could be given, suited to their age group, in the planting, care and cutting of forest trees. The inauguration of such a program among the young rural citizens of Pennsylvania would aid the State program of fire prevention and develop among our younger men and women a greater consciousness of the importance of forests to their own future welfare.

3. Replanting

To insure an adequate future supply of forest trees the State should undertake (1) the replanting of cut-over areas whereever such replanting is necessary, due to lack of sprout or seedling reproduction; (2) the planting of waste lands or lands now covered with scrub growth, and (3) the encouragement of types of forestry practice which would insure the reseeding of cut areas by desirable species of trees. The State should also continue to insist upon the replanting of areas devastated by strip mining operations in order to remove the ugly scars which now deface the neighborhood of many towns in the State's mining regions, to stabilize the soil of strip banks and to insure future usefulness of the land on which stripping operations have been conducted. On this latter point further research is probably necessary as to types of trees best adapted for planting on strip banks to insure the permanency of plantings once made.

The State Department of Forests and Waters every year grows and disposes of several million young trees to be used in planting operations. The number presently supplied is totally inadequate for the replacement needs of the State. It does not supply trees sufficient to replace even the annual burn.

The number of seedling trees and transplants supplied by the State for replanting should be greatly increased, but since a planting of young trees requires approximately 1000 per acre, this operation may involve labor and expenditure beyond the means of many owners of small or large tracts of at present profitless land. The State could well undertake to plant such waste or cut-over areas, holding the cost of this operation as a lien against the future tree crop of the planted area. The owner of such a tract would lose nothing and would stand to gain substantially in the future value of his land. Employment would be provided by the State in a profitable undertaking. The protection of the tract against fire, the only hazard involved to the State on such a project, should be shared with the owner of the land who could, as a condition of the replanting operation, assume the responsibility of assisting the State in measures of fire protection until the lien is satisfied. Such an operation would be necessary only where the owner was unable to undertake replanting.

The operation of such a plan might well induce other agencies, whose long-term existence is assured, such as civil subdivisions of the Commonwealth, educational institutions or lumber companies, to engage in a similar long-term investment in the reclamation of low-cost non-agricultural land.

The State Planning Board gratefully acknowledges suggestions and additions to the text of this issue supplied by Dr. S. W. Fletcher, former Dean of the School of Agriculture, Professor Victor A. Beede and Dr. William Clark Bramble of the Department of Forestry of The Pennsylvania State College, and by W. E. Montgomery, Deputy Secretary of the Pennsylvania Department of Forests and Waters, George H. Wirt, former Chief of the Division of Protection of that Department, and Dr. T. L. Guyton, Director of the Bureau of Plant Industry, Pennsylvania Department of Agriculture.

Photographs on pages 9, 23, 24, 29, 30, 35 and 36 were supplied by the Pennsylvania Department of Forests and Waters; those on page 22 by the Pennsylvania Department of Agriculture, and those on pages 10, 15 and 16 by the Pennsylvania Department of Commerce. The Air Photograph on page 21 is from the files of the Pennsylvania State Planning Board.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

- *1—Preliminary Report. 682 pages, 152 charts, December, 1934.
- *10—Drainage Basin Study. 3 vols., 611 pages, 1937.
- 11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)
- 12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)
- 13—The Pennsylvania Zoning Primer. 1940.
- 14—Industrial Utility of Water. Part 1. Temperatures and Chemical Content at Low Flow. June, 1945.
- 15—Recent Industrial Trends and New Employment Opportunities in Pennsylvania, 1944.
- 16—Retail Trade in Pennsylvania, 1946.

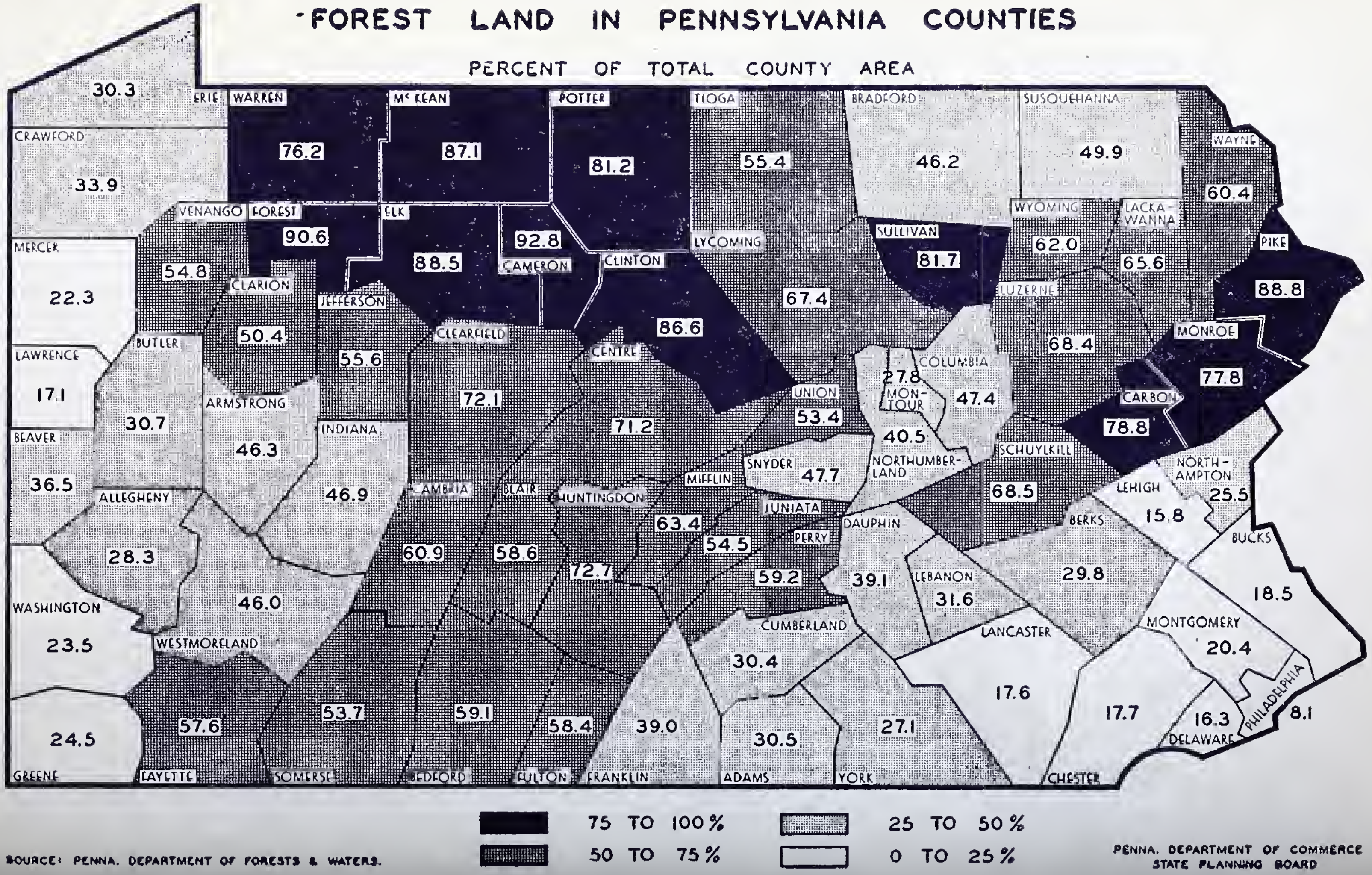
These publications may be seen in representative public libraries. A limited number of those listed are available for distribution until the present supply is exhausted. Those marked with an asterisk are now out of print but may be seen in representative public libraries.

The following issues of **Pennsylvania Planning** are still available.

- Local Tax Rates, May-June, 1940.
- Community Self-Appraisal (Revised Edition), April, 1942.
- Comparative County Data, May, 1942.
- Planning and Zoning Progress in Pennsylvania, July, 1942.
- Population, October, 1942.
- Handicrafts in Post-War Planning, May, 1943.
- Plastics, July, 1943.
- Air Photographs, February, 1944.
- Light Metals and Stainless Steel, August, 1944.
- Topographic Mapping Needs, February, 1945. (For limited technical distribution.)
- Community Action for Local Self Development, July, 1945.
- Conservation, August, 1945.

FOREST LAND IN PENNSYLVANIA COUNTIES

PERCENT OF TOTAL COUNTY AREA



SOURCE: PENNA. DEPARTMENT OF FORESTS & WATERS.

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SOIL CONSERVATION

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

SEPTEMBER 1947

COMMONWEALTH OF PENNSYLVANIA
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Pennsylvania Planning

To inform those who
are interested and
to interest others.

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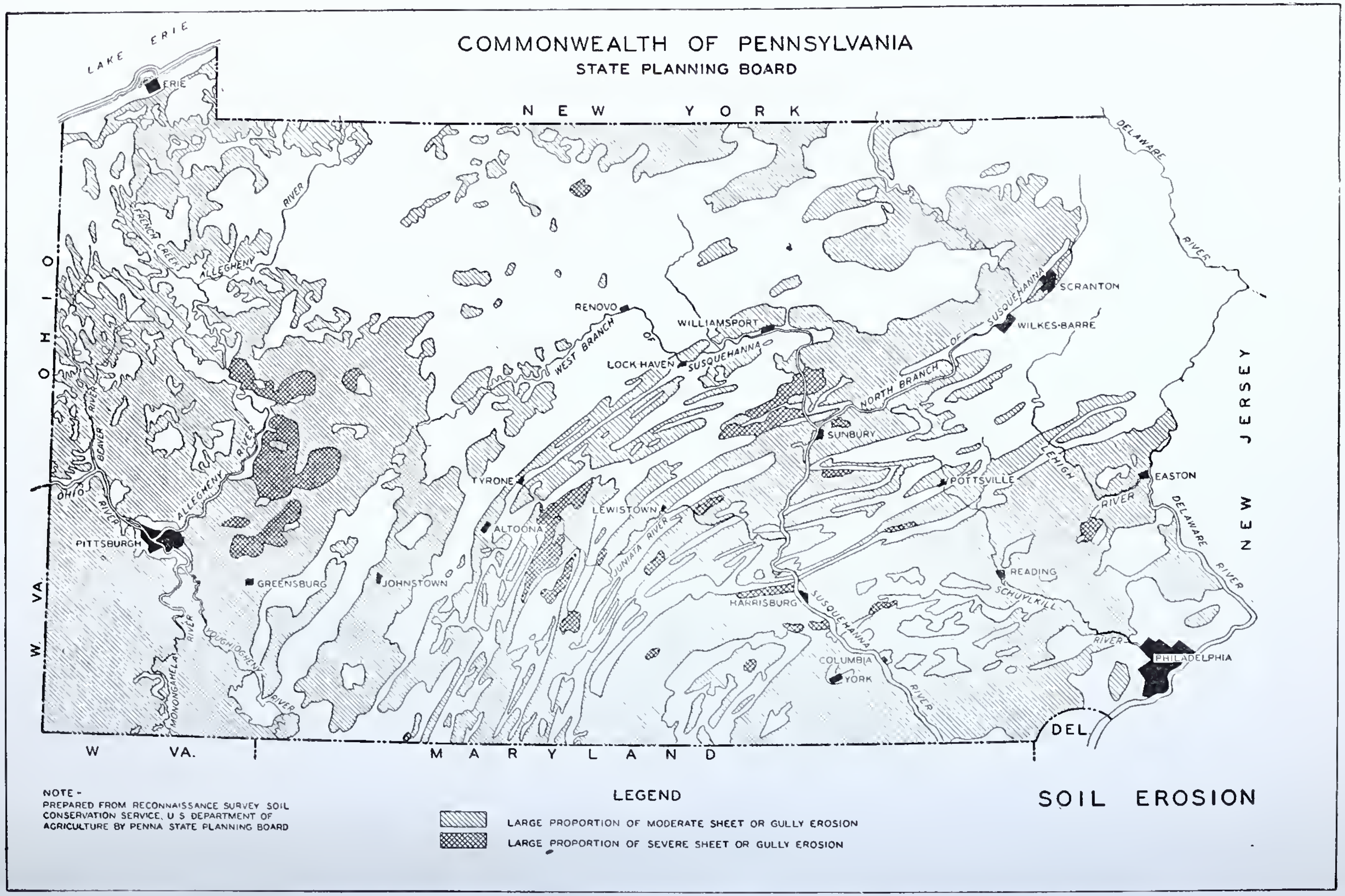

COMMONWEALTH OF PENNSYLVANIA
STATE PLANNING BOARD

SOIL EROSION

LEGEND

▨ LARGE PROPORTION OF MODERATE SHEET OR GULLY EROSION
▩ LARGE PROPORTION OF SEVERE SHEET OR GULLY EROSION

NOTE -
PREPARED FROM RECONNAISSANCE SURVEY SOIL CONSERVATION SERVICE, U S DEPARTMENT OF AGRICULTURE BY PENNA STATE PLANNING BOARD

The Conservation of Pennsylvania's Soil

A Very Old Story

Behind the long historic record of wars, inventions and arts lies the evidence of a more fundamental struggle of civilized man to maintain the sources of his livelihood. In that struggle there have been many defeats and a few victories.

The first record of a great and expanding civilization attempting to maintain itself with declining resources of soil fertility and ground water is recorded in the Code of Hammurabi at the end of the third millennium before Christ, "If a man neglect to strengthen his dikes, and a break be made in his dike and the water carries away farm land, the man in whose dike the break has been made, shall restore the grain which he has caused to be lost."

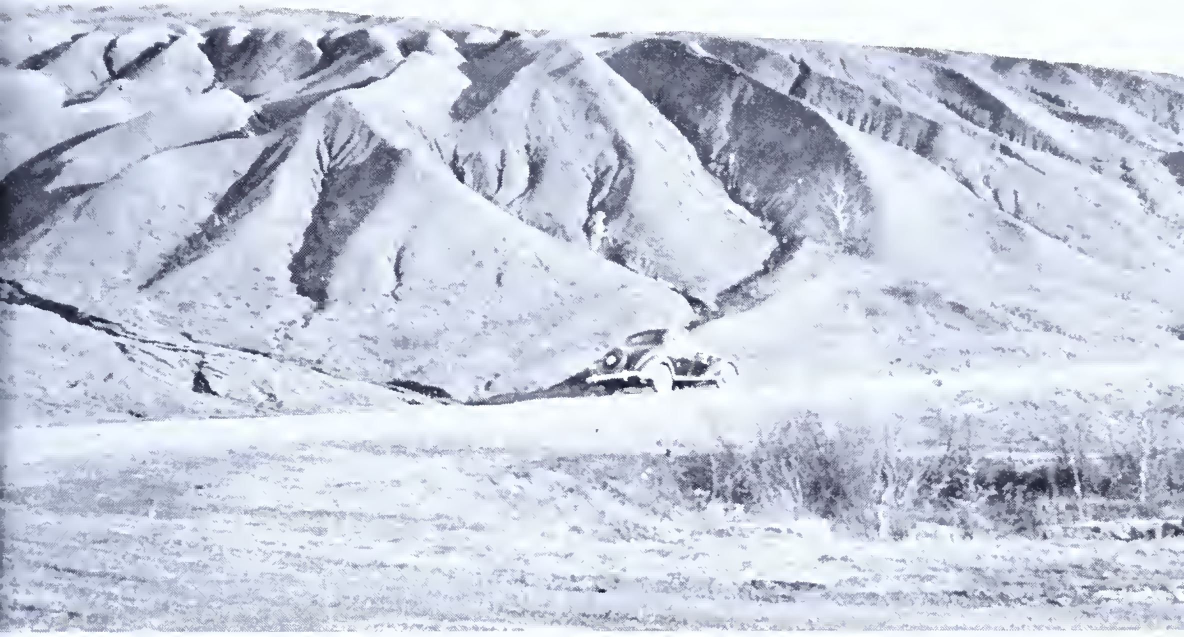
During a long period of struggle with alien invaders the rigid principles of soil and water conservation recorded by this great Sumerian King were gradually lost sight of. Dikes were silted up or broken; the precious topsoil accumulated down stream in the Tigris-Euphrates delta; the lakes became dry plateaus or worthless marshlands. The first civilization ever created by man slowly declined. Ruins of the palaces, temples and ziggurats of Nippur, Babylon, and Nineveh stand today in a wilderness of desert sand.

There is little evidence that the climate of the Tigris-Euphrates valley has changed perceptibly during historic times. This valley once created and maintained the dominant civilization of the world; it accumulated enormous resources and supported an extensive population. Here were invented the first practical writing and the vital mechanical device of the wheel. Its rulers worked out an elaborate system of irrigation; diverted the courses of great rivers, and developed notable arts. Yet the region is today a dry and impoverished semi-desert land whose remaining natural resources—mostly underground—await exploitation by foreign capital.

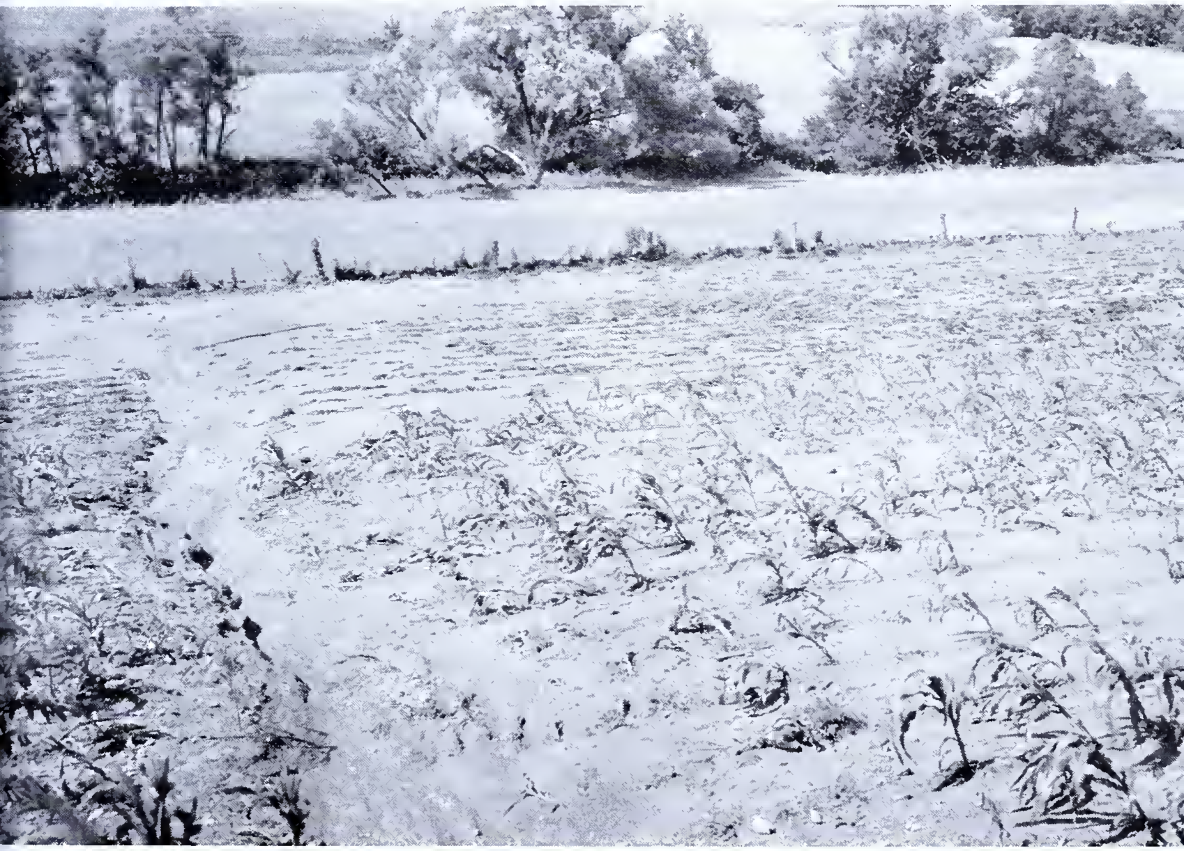
The Price of Progress

The United States is the modern world's most powerful nation, but that power is based on its rapid development of a wealth in raw materials which had accumulated here over a period of many million years. Approximately three centuries ago this vast area was first opened to European settlement. It had lain fallow and untouched during the six thousand years of recorded history, while many great civilizations had risen and fallen on the other side of the world. When the first settlers came to our shores, social conditions throughout all Europe had seriously deteriorated; poverty was widespread; the ownership of land was a privilege of the relatively few who possessed hereditary privileges. The passion for freedom engendered by centuries of constraint and repression was working like a ferment throughout all western Europe.

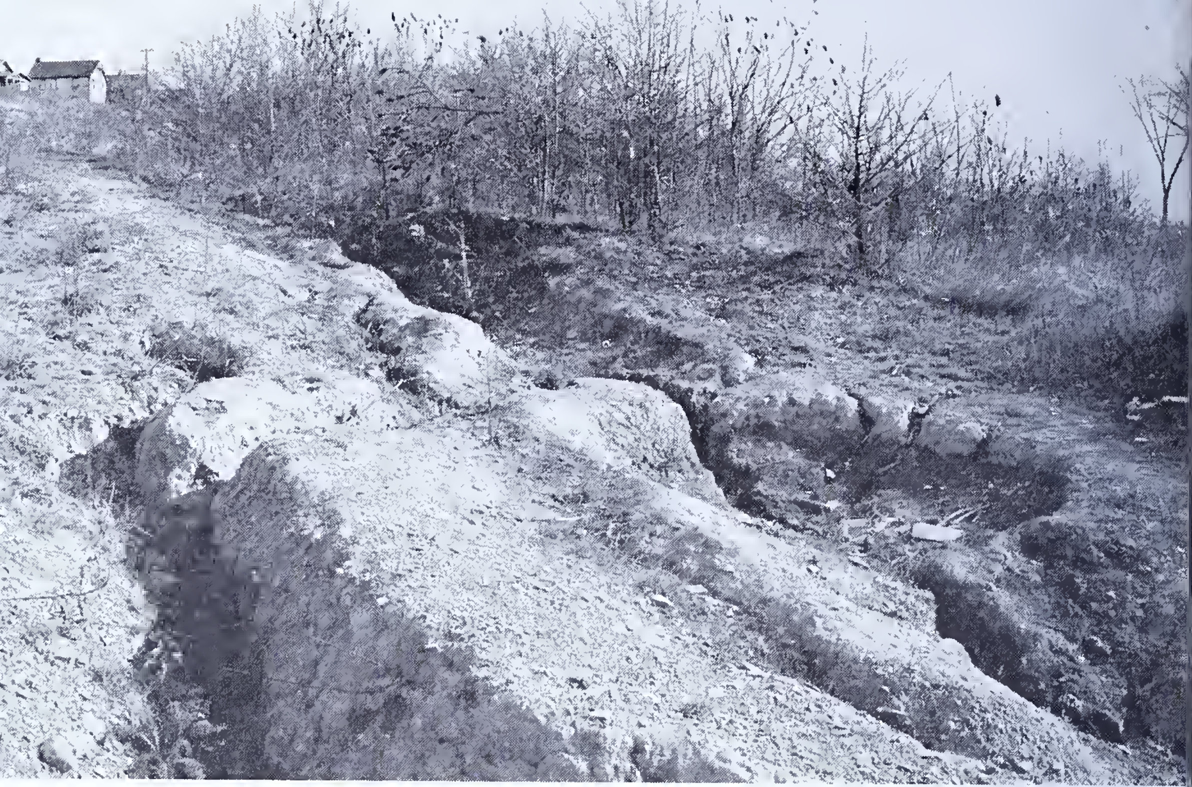
The early settlers of America were men and women to whom the untouched soil of our land represented incredible opportunity for personal freedom and self-advancement. In the three hundred years which have followed, those dreams of opportunity have been realized to an extent never before known in human history. But the richness of our inheritance has devel-



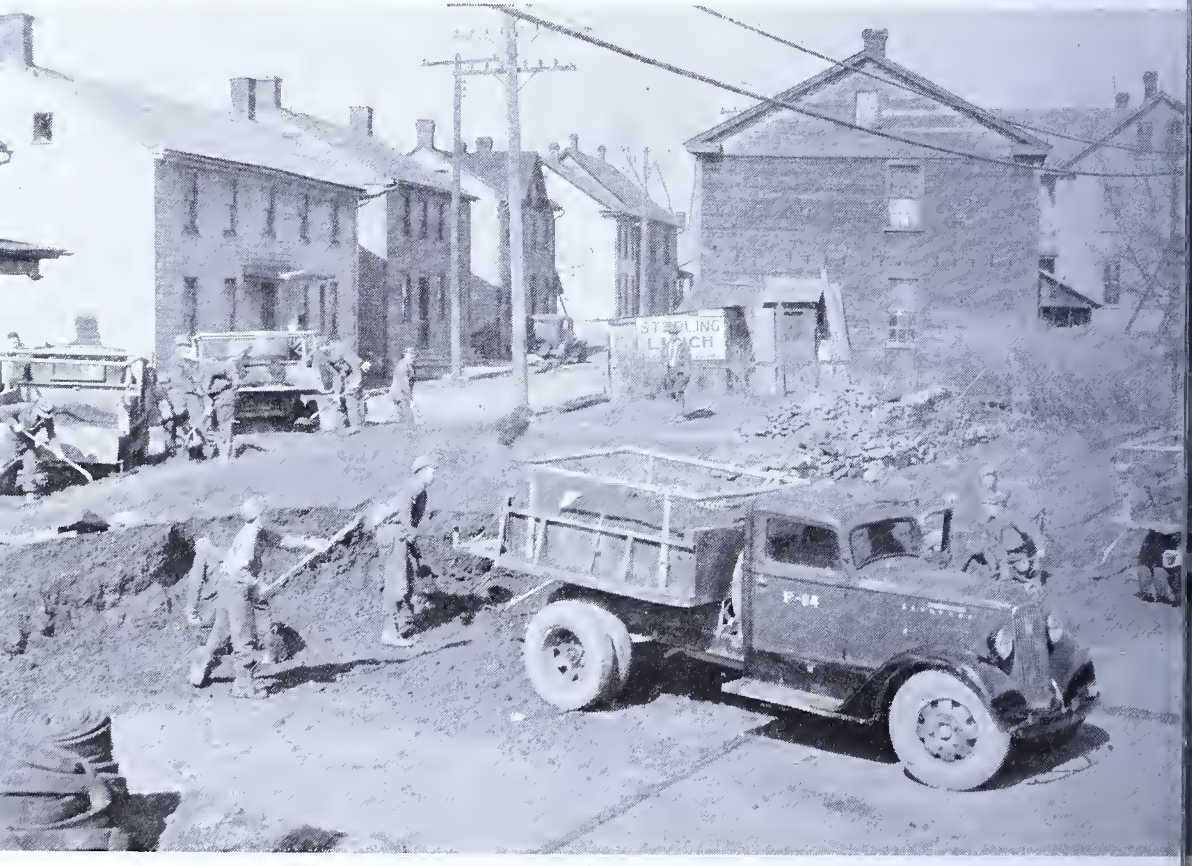
This happens when a hillside loses its vegetation.



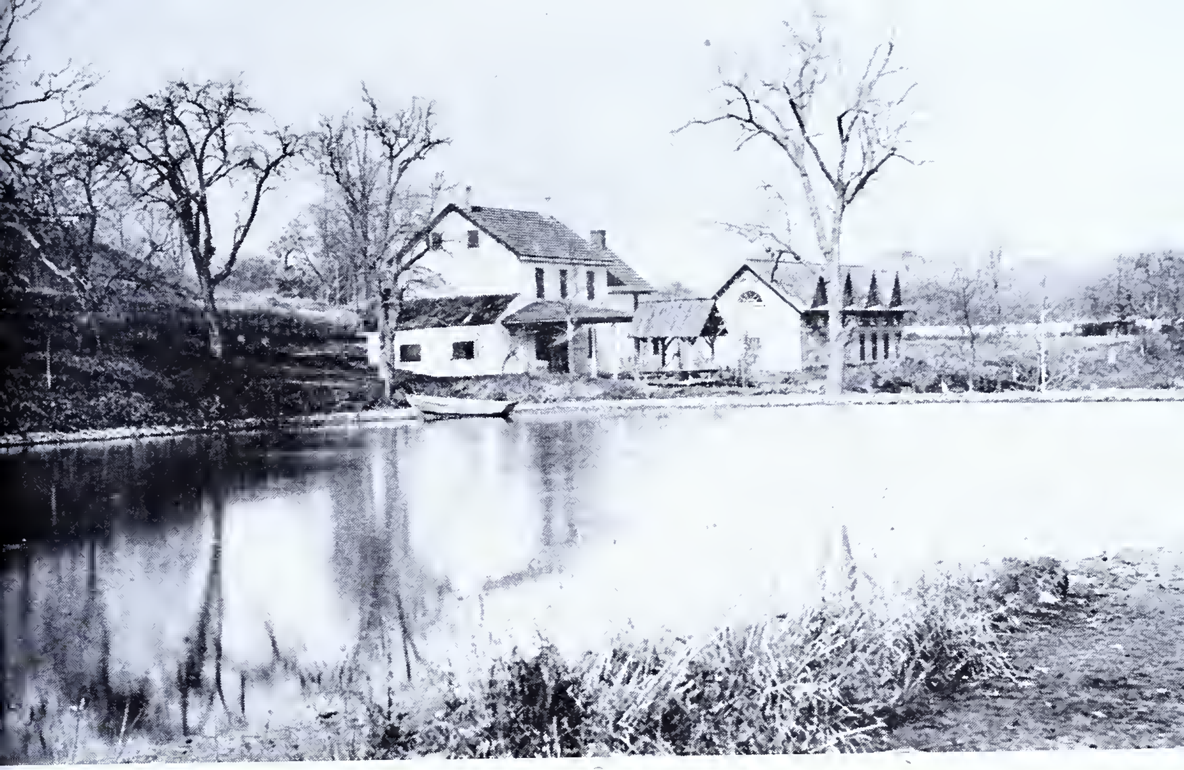
This cornfield with inadequate humus in its soil is exposed to surface drainage from further uphill.



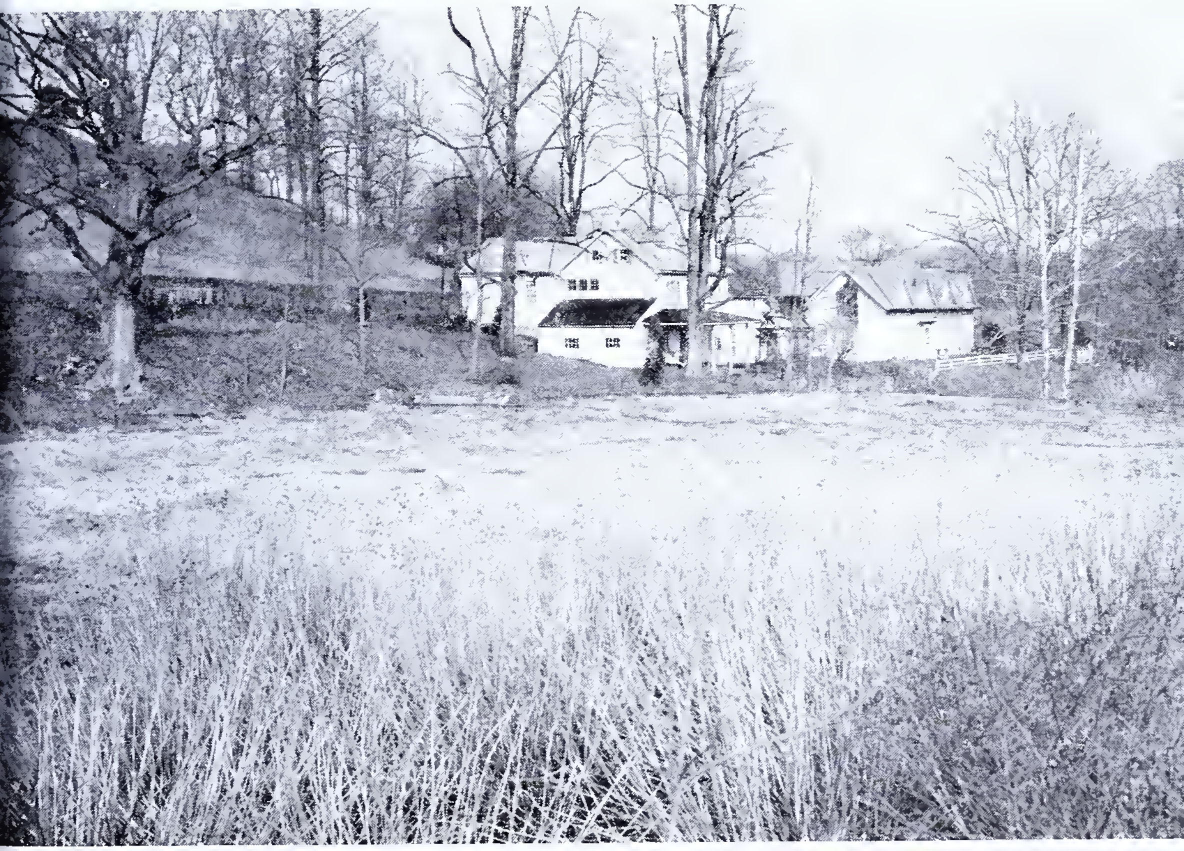
This eroded and neglected hillside in a Pennsylvania city



causes conditions like this in the streets below.



Thirty years ago this pond controlled stream flow and provided food-fish, recreation, and water power.



Today it has silted up and become a worthless bog.

The silt filling this Mifflin County reservoir

or drifting across this Lancaster County road is the lost top soil of unprotected fields.

oped in all of us the reckless confidence that we, of all nations, are the only one possessing resources which can be used prodigally with no thought of consequences. Unhappily this is no longer true. In Pennsylvania, as in all of our eastern and first-settled states, that fact is more evident today than in many of the yet undeveloped areas of the west, but there is no part of America that has not felt its impact in the past four years. During those years we have consumed our resources at a rate which could not continue if we expect to maintain a permanent civilization in America with a standard of living held even at its present high level.

Our Declining Resources

The great oil reserves of the world are no longer those of the United States. During the past twenty years we have used up incomparably more petroleum than has any other nation. Yet our present civilization, as well as our power of self-defense, depends on this precious fluid, which was once produced so wastefully here that literally rivers of it flowed away unused.

We have slashed down our great forests so heedlessly that much of our old timberland will be relatively useless for a hundred years. Great areas of the open prairies of the west have become a dust bowl; fifty million acres of American farm land have been destroyed by wind or water erosion since the white man first settled them. One hundred and twenty-five million acres have lost all or the greater part of their topsoil. Man-induced erosion is progressing on more than a billion acres in the United States—more than half of the whole territory of our nation.* And besides the effect of erosion from the wash of streams no longer protected by dense forest growth and from the improper plowing and cultivation of our fields, there has been a slow but noticeable decline in the fertility of our soil.

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* J. Russell Smith—Men and Resources—Page 11.

A Problem Here Since 1740

In Pennsylvania many of the effects of soil erosion were noticed at an early period. The cleared forest land at first supplied a soil capable of absorbing large amounts of surface water, but the grain crops cultivated by the early farmers made heavy demands on the organic content of the soil and no thought was given to the necessity of alternating the grain crops with grasses or clover. After less than a generation of such farming yields began to decline. Many of the original farmers moved further west to repeat on new territory the soil robbery which their methods of farming had brought about. By 1740 there were many worn-out fields in the areas where the earliest clearings had been made. That soil was still fertile and is today producing abundant crops where it has been properly restored, but there was then little humus left and little power to absorb the heavy spring rainfalls As a consequence severe erosion occurred, and because of a lack of stored water in the ground there was a notable decline in the flow of many of our streams in dry weather.

By 1753 this condition had developed to such an extent that the evidences of soil destruction were being given serious attention, and a correct theory had already been developed as to their cause. In Evans Lewis' "Brief Account of Pennsylvania," written in that year, occurs the following passage: "When the country was covered with woods and the swamps with brush, the rain that fell was detained by these interruptions and so had time to insinuate into the earth and contribute to the springs and runs, but now the country is clear and the rain, as fast as it falls is hurried into the rivers and washes away the earth and soil of our naked fields, fills and cloaks the springs and makes shoal and sandbanks in our creeks and rivers."

Early interest in arriving at methods for dealing with this condition is shown by the prize offered in 1791 by the Philadelphia Society for Promoting Agriculture, "To find the best method of recovering our gullied fields to a hearty state or, when damaged beyond remedy, how best to use them for tree planting."

This prize was never claimed, but the last decade of the Eighteenth Century is notable as an important turning point in the progress of Pennsylvania agriculture. It was at that time that the value of lime or gypsum for encouraging the growth of clover and grasses was first recognized in the State. This made possible the rotation of grains with forage crops and the gradual restoration of the lost humus in the soil. It also made possible the maintenance of larger herds of cows and a heavier manuring of the fields than had been practiced before.

The surface of Pennsylvania is broken by mountain ranges. As a consequence a considerable number of our farms have portions of more or less severely sloping ground. On such fields rotation of grain crops with pasture did not solve the erosion problem. About the time of the Civil War some farmers in the State, notably in parts of Lycoming County, began to lay out their fields on the contours and have been continuing to do so ever since, but no general attempt was made to control soil erosion until after the turn of the Twentieth Century.

At the time of the first World War the Agricultural Extension Service of the Pennsylvania State College initiated its first farm demonstrations on methods of sound farm management such as deep plowing, crop rotation to restore the humus in the soil, better pastures and better care in the use of farm manures.

The U. S. Department of Agriculture came into the field with its Soil Conservation Service in 1935. Though much progress has been made in the intervening years, soil losses continue to be heavy. The effort to maintain and restore the full possibilities of the State's soil remains one of the most important undertakings now facing the people of the Commonwealth.

A soil erosion survey of Pennsylvania conducted by The Pennsylvania State College has determined that 49% of the State's non-urban land has lost between one-fourth and three-fourths of its topsoil. The decline in *fertility* is less evident and less dramatic. It is, however, an important long-term factor in the problem of maintaining a steady food supply for an increasing number of people.

Erosion and Soil Formation

Erosion is a geological process which has been in continuous operation for many million years. It has produced almost all the valleys on earth; it has cut down the ancient Laurentians and the once towering Appalachians to rolling and sometimes scarcely distinguishable hills where once rose the tallest mountains in the world. Erosion was a process proceeding briskly at the time of the first settlement of our land, but far less briskly than it is proceeding today.

Though erosion is a continuous consequence of geological forces, man's activity in clearing and cultivating the land hastens a process which slowly, or sometimes with extreme rapidity, deprives him of an ample food supply.

In nature, certain checks operate to slow down and limit the washing of soil into our creeks and rivers. In fact, the whole history of life on earth seems to have the form of a biological battle of living things to retain and form a top soil layer which the great forces of nature persistently attempt to destroy or wash away.

All early forms of vegetation—the lichen which covers bared rocks, the mosses, and such ancient plants as horsetail, now surviving on culm banks and railroad cinderbeds, can develop on land almost destitute of organic matter. This is also true of such plants as seaside grasses which spread their roots through the loose sands of shifting dunes and of established trees whose tap roots go deep into inorganic material and often split the underlying rocks. These are the pioneers of vegetation.

Over most of the area of Pennsylvania, for a period much longer than that since the last great glacial age, the slow process of soil formation by such plants has been proceeding. As a result of its complex chemistry there has occurred the enrichment of inorganic minerals into a more complex mixture in which carbon and nitrogen derived from the air have penetrated deep into the surface layer through the decay of plant roots and the rotting of surface growth. Upon this transformed and enriched rock, sand or clay we must depend for our food, for it is only that which can properly be called *soil.* It is rarely a very deep layer, as one may readily see by observing the cuttings made for our highways and railroads. It is not deep because the growth of the thousand generations of trees and of the hundred thousand generations of weeds and grasses which accumulated it were always fighting the effect of torrential rainfalls and the irresistible cutting power of running water, but it was deep enough to provide the raw material for human civilization. In fact, the oft-quoted statement, "Civilization depends upon nine inches of topsoil," is almost literally true.

Man's activity has weakened the power of vegetable life to form and conserve this soil. He has cut down the forests and cleared the fields of weeds and grass. Plows have turned under the thick protective turf, and axes have exposed steep hillsides to the direct impact of heavy rains. The balance of nature has been destroyed, and the very source of our life is being despoiled needlessly of its richest gifts for men.

The wornout soils of modern Greece and China, the prostrate poverty of modern Italy, the recent tragedy of our western dust bowl are merely dramatic examples of a process steadily continuing here and, over a long term, threatening the well-being of our nation.

Why Topsoil Is So Important

The top soil is a chemical laboratory in which many of the tissue building elements present in the rocks and air are slowly converted into forms more usable by the higher plants on which we depend for our food. A phenomenon very similar to the processes of life is exhibited by the surface of the earth. Soil bacteria break down organic matter and release carbonic acid which converts soil minerals into soluble compounds. Nitrogen is essential to plant growth. During an electrical storm nitrogen oxides are formed in the air and reach the ground dissolved in rain drops, but a more important source of this element is in the bacterial breakdown of the ammonia in the plant roots and leaves which accumulate in the soil.

Prevention of soil erosion will automatically conserve organic matter with its available nitrogen.

One of the vital minerals for any agricultural crop is phosphorus. It is essential to all animal growth. It is a most important mineral element in human food. The bony structure of man as well as of all animals cannot develop or be maintained in health with an inadequate supply of phosphorus. It is essential to the structure of the brain and the nervous system. The soil of the United States is not notably rich in this essential mineral whose presence largely determines the production per acre of many of our most important crops. The United States Department of Agriculture has proved that when corn is grown continuously on a 3.7% slope, more phosphorus is lost by erosion on an acre of land in one year than is used by a seventy-five bushel corn crop. Even where good rotation is practiced the loss of phosphorus per acre by erosion is the equivalent of that used in twenty-five bushels of corn.* The amount of this precious mineral—costly to replace by commercial fertilizer—

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* "Soils and Men." United States Department of Agriculture, 1938.

removed from American soil every year by erosion is equal to that required by all the harvested crops and grazing land of the nation. The total annual phosphorus loss by erosion is more than 2,000,000 tons.†

Present conditions of world scarcities produced by war are probably temporary, but they have not altered the fact that the amount of available phosphorus, potassium, nitrogen and other essential elements in any soil, and the amount of water retained to supply the roots of growing plants through dry seasons are the physical factors which limit the food produced per man-hour of labor on the farm. It is the topsoil in which these minerals are chiefly present in available form, and it is largely through proper land use and conservation measures that erosion can be controlled and surface water and topsoil minerals usefully retained.

Is Conservation Really Necessary?

Why should the people of Pennsylvania be concerned about the future of their soil, when the population of Europe has maintained itself largely by agriculture over a period of thousands of years? Is this new concern about the future of our soil resources really justified by the facts? These are questions frequently asked, and the doubts they express as to the necessity for soil conservation largely explain the indifference of many persons to the most vital source of our national strength and stability.

It is true that Europe has largely maintained itself upon its own soil, although of late years such great nations as Germany, France, Belgium, Holland, and Great Britain have grown more and more dependent on imported foodstuffs—a fact tragically emphasized by their want and misery in the years following the Second World War.

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† J. H. Lipman—A. B. Coneybear. Preliminary Note on the Inventory and Balance Sheet of Plant Nutriments of the United States. New Jersey Agriculture Experiment Station Bulletin No. 607.

Population and the Land

But it must be remembered that during the 19th century the population of Europe and of the whole world has enormously increased. In 1770 the population of Europe was approximately 150,000,000 people. By 1845 this total had risen to 240,000,000; in 1940, it was between 520,000,000 and 540,000,000. What is true of Europe is also true of Asia and Africa. The world's population which now approximates 2,200,000,000 was probably less than 600,000,000 in 1775 and probably not more than 445,000,000 in 1650*—a figure less than the present population of China.

It must also be remembered that while much new land has come into production during the past hundred or two hundred years, much old farm land has been abandoned or become submarginal, and the drain on the land now under cultivation is far greater than ever before in the history of the world.

The remarkable growth in population which has occurred, largely during the period of the independence of the United States, has been due to direct or indirect effects of the industrial revolution. The introduction of factory methods in the processing of raw materials, the use of steam transportation on land and on water, and the development of many new types of agricultural devices, together with improved sanitation and the control of plant disease have enabled man to subdue nature with reasonable success. Because of high speed distribution, farm technology, and new strains of seed, we are now able to support a far larger number of people in the world than was ever believed possible by such economists as Dr. Malthus one hundred and fifty years ago, but in achieving these triumphs over nature we have also done much, as a victorious army often does, to destroy the very thing we have conquered.

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* Raymond Pearl. The Biology of Population Growth.

Our Crops and Our Climate

The three characteristic crops of the thirteen colonies were corn, cotton, and tobacco. None of these crops had ever been grown in the fields of Europe where the grain crops were wheat, barley, oats, and rye; the fibre crop was flax, and tobacco was known only as a rare medicinal. Flax and the smaller grain crops provide root masses that retain the soil on moderate slopes. Severe slopes in Europe were almost never plowed, and consequently there is little erosion at any point across the rolling topography of Great Britain, southern France or central Germany.

Moreover, those countries from which our ancestors migrated are at a latitude far to the north of the most of the United States. In their climate, whose moisture and heat are largely supplied by the Gulf Stream, there is a marked absence of cyclonic storms. It is no accident that the lightning rod was invented by an American. A thunderstorm is a rarity in western Europe, but it is the thunderstorm with its heavy and almost tropical downpour which washes the soil of American hillsides down into the valleys and river bottoms, particularly when that soil is cultivated off the contours of the land in open crops.

In rural Europe the relation between field and forest, pasture and plowed land has been stabilized for hundreds and in some areas for thousands of years. In most of America that stability has never been established.

Our incredible wealth of forest trees invited wanton destruction which for a long time we could not avoid, but today we are paying the price for it. We witness the cost in the drastic changes of level in our eastern rivers following periods of heavy rainfall. We also witness the cost in the muddy, turbulent waters of those same streams washing millions of tons of topsoil downstream to be lost forever to human use in the river flats and the sea.

Soil erosion is a costly form of waste. Of all the means by which we are letting the great wealth and power of America dribble away between our fingers, the loss of surface soil and the waste of surface water probably affect all of us most deeply. We feel it in every trip to the grocery store; we see its effect in the high cost of every article of food.

To Increase Farm Productivity

Agriculture is more than a production process. It is also a way of life still based largely on the family unit and depending for a considerable part of its attractiveness on the permanency of the land as a source of wealth. The average farmer with a growing family is perhaps more interested in the future of his farm than is any other type of business man or producer in the future of his establishment or his factory. He knows the land on which he makes his living will, humanly speaking, be there forever. If he has sons, he has the hope that it will provide them a good living after his active days are over. It is to his family's interest that the land shall pass on to the next generation in a better condition of productivity than when he received it. That is his best form of insurance as to his family's future.

He is also concerned that he should be able to provide for his family the mechanical advantages which now can be had and which greatly increase the comforts and conveniences of agricultural life, but he also realizes that the percentage of agriculture in the national income has steadily declined. That percentage, which was nearly 40% in the year 1800, dropped to 31% by 1850; 22% by 1900, and was approximately 12% in 1937.* Though the index of agricultural output has slowly risen, due to many factors, the farmer realizes that while improved strains of seed, new types of fertilizer, modern insecticides and farm machinery have all combined to increase his output, all these factors have not succeeded in bringing farm

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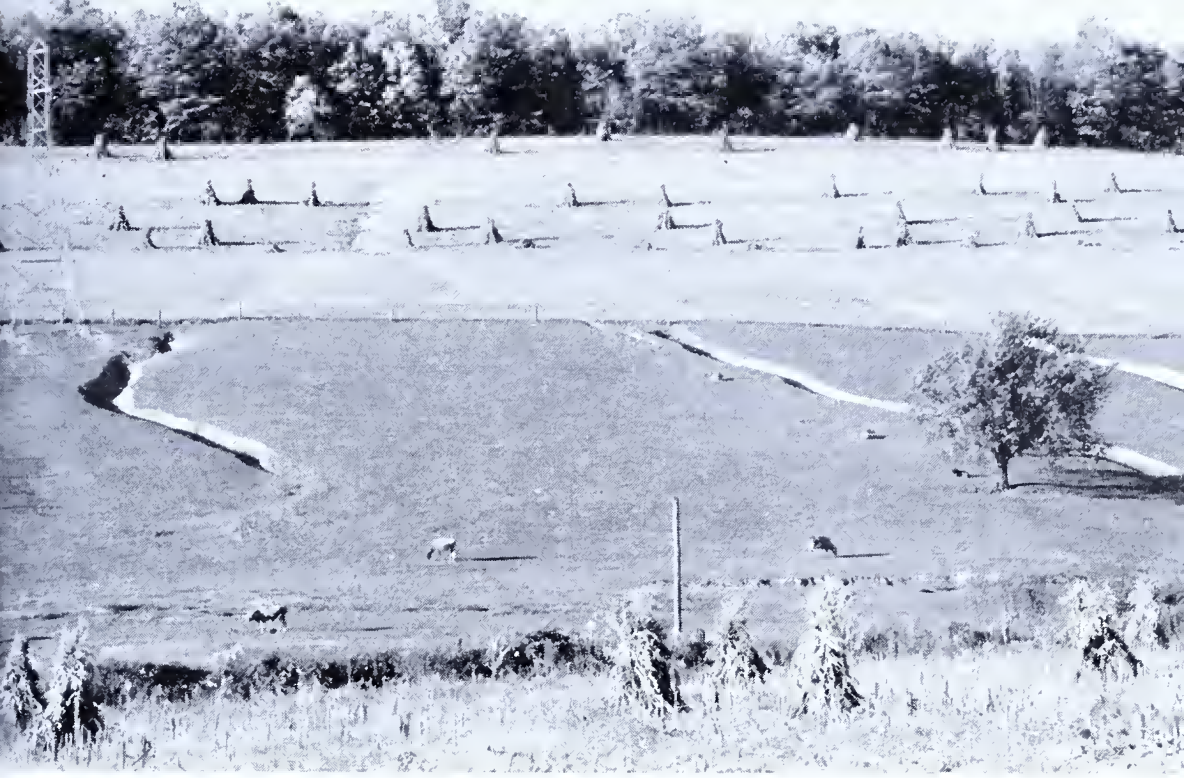
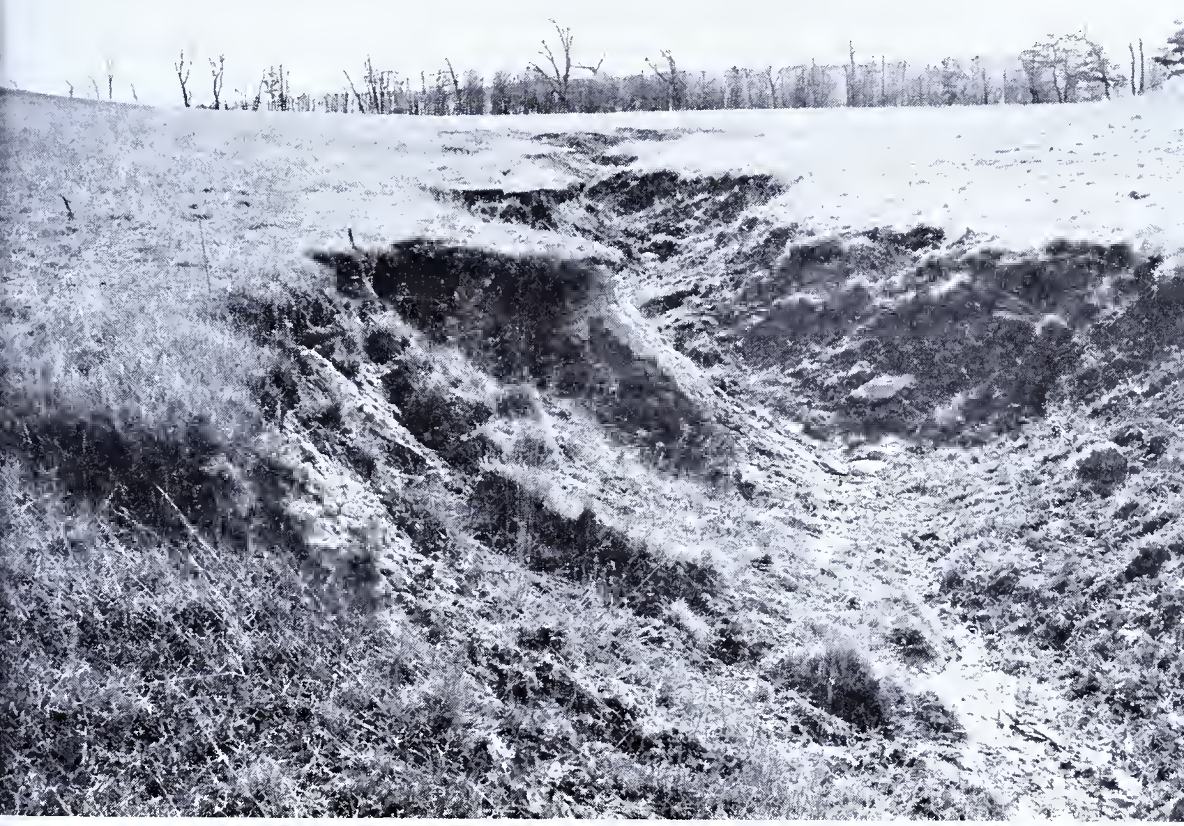
* R. F. Martin—National Industrial Conference Board, 1939.



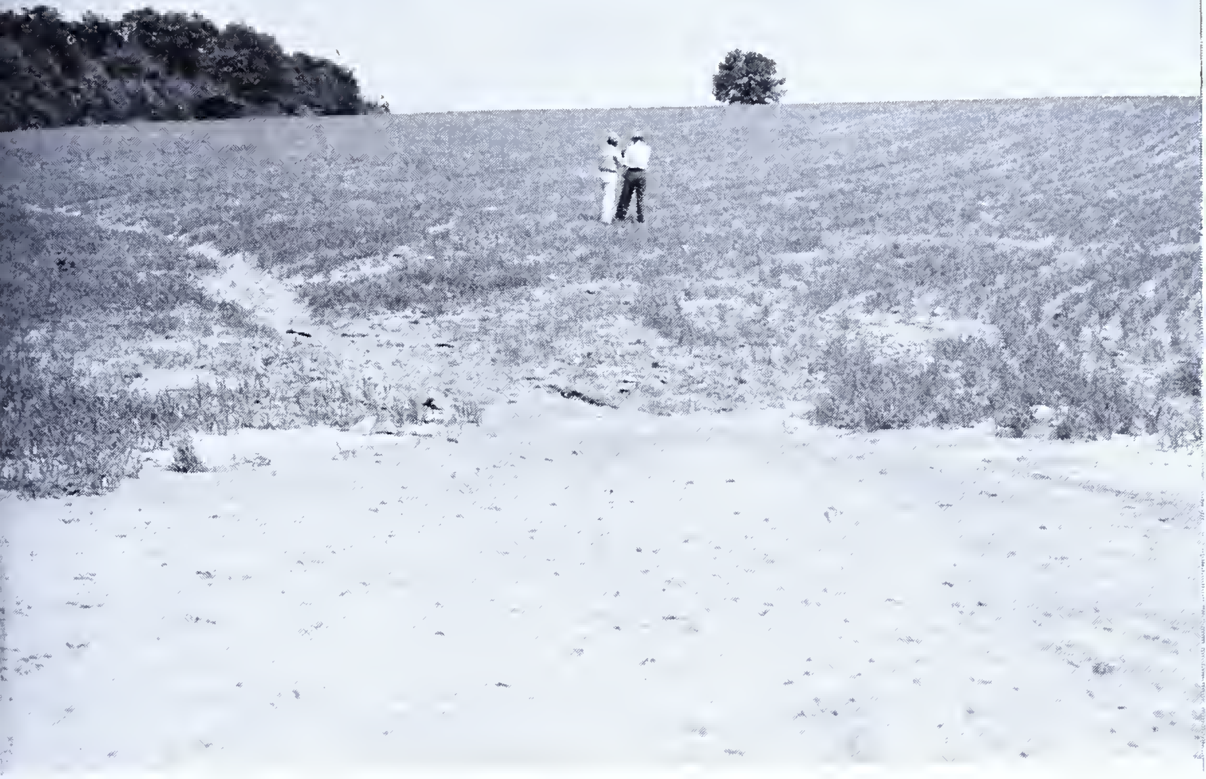
The gullying of the upper field is being controlled by strip cropping, but such damage is more easily prevented than cured.



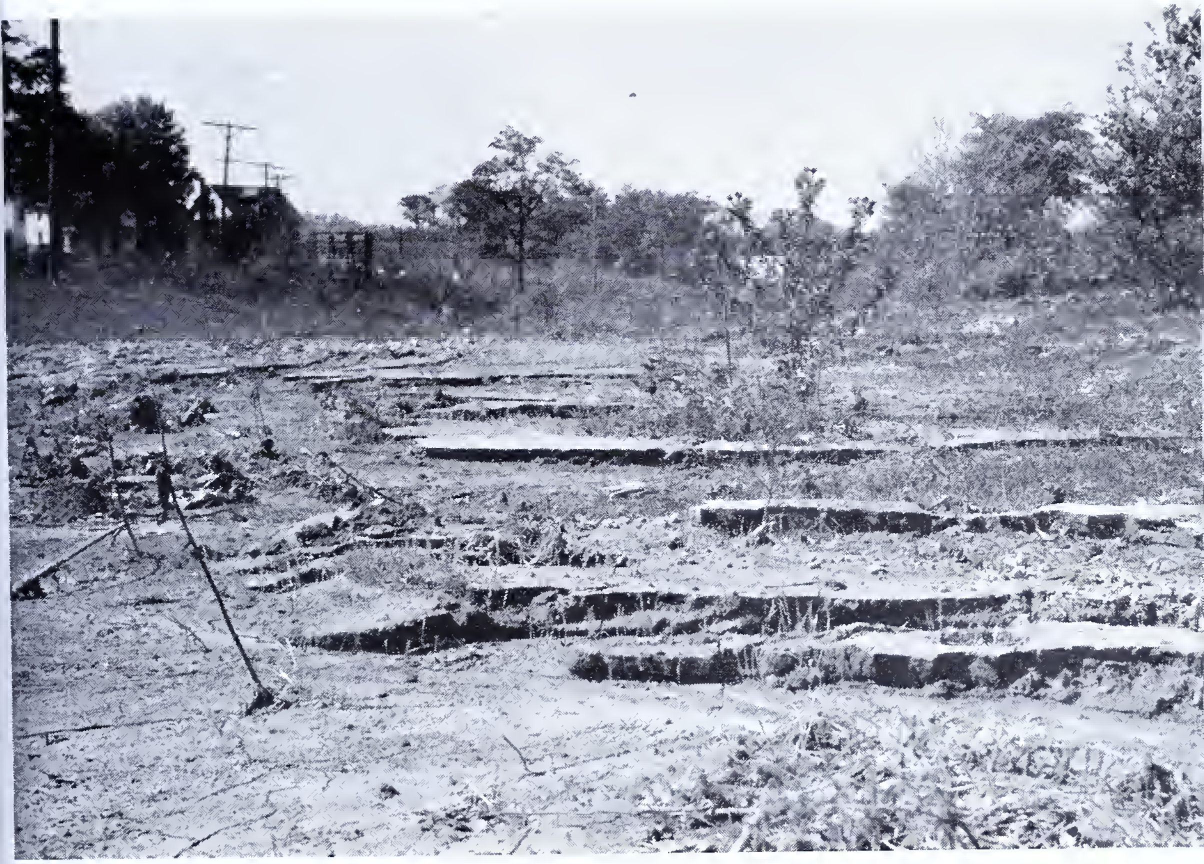
Uncontrolled gullying grows worse with every heavy rainfall.

This ten-year-old plantation of Scotch and White Pine protecting the field below it

was planted on contour furrows on a hillside too steep for cultivation.



Sheet and gully erosion on fields of moderate slope



can end in complete destruction of the surface soil.

This hillside is being protected. Trees have been planted on the brow of the hill. The lower field cultivated on the contour will be sowed to grass.

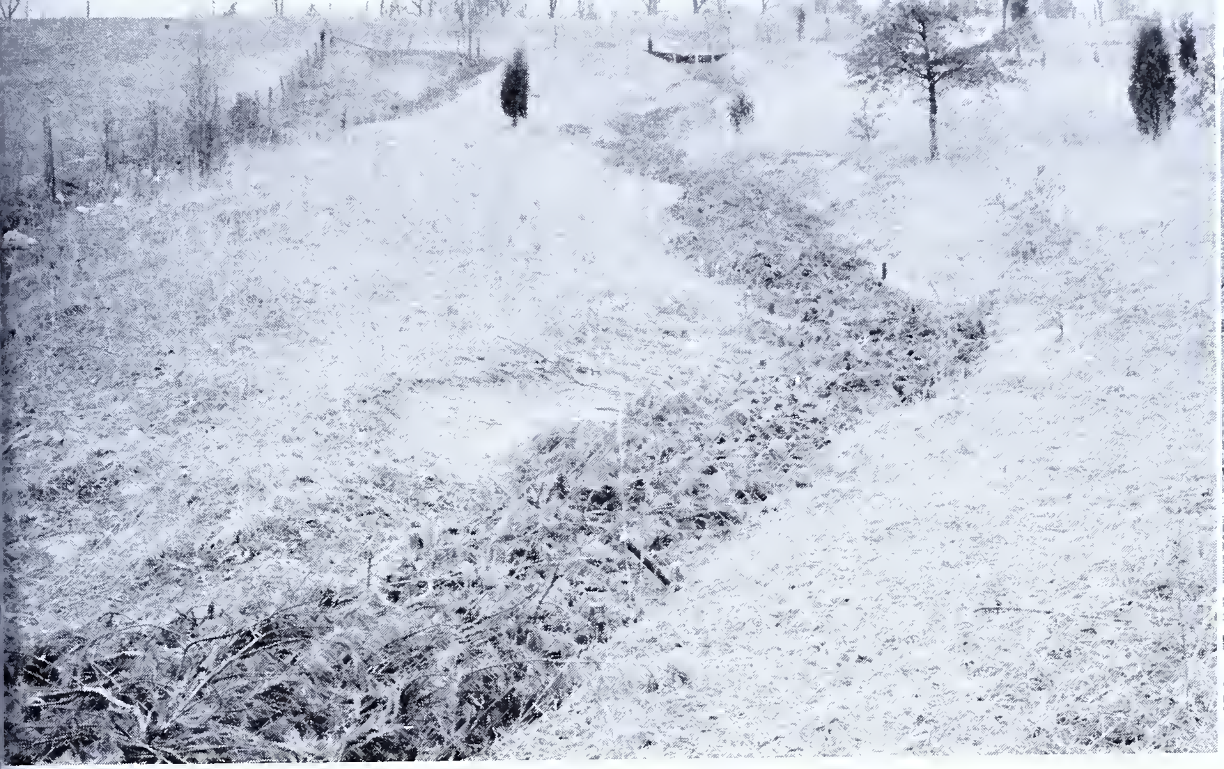
This slope, planted to corn in down hill rows, will soon be waste land.

Open crops planted on the contours in well-conditioned soil

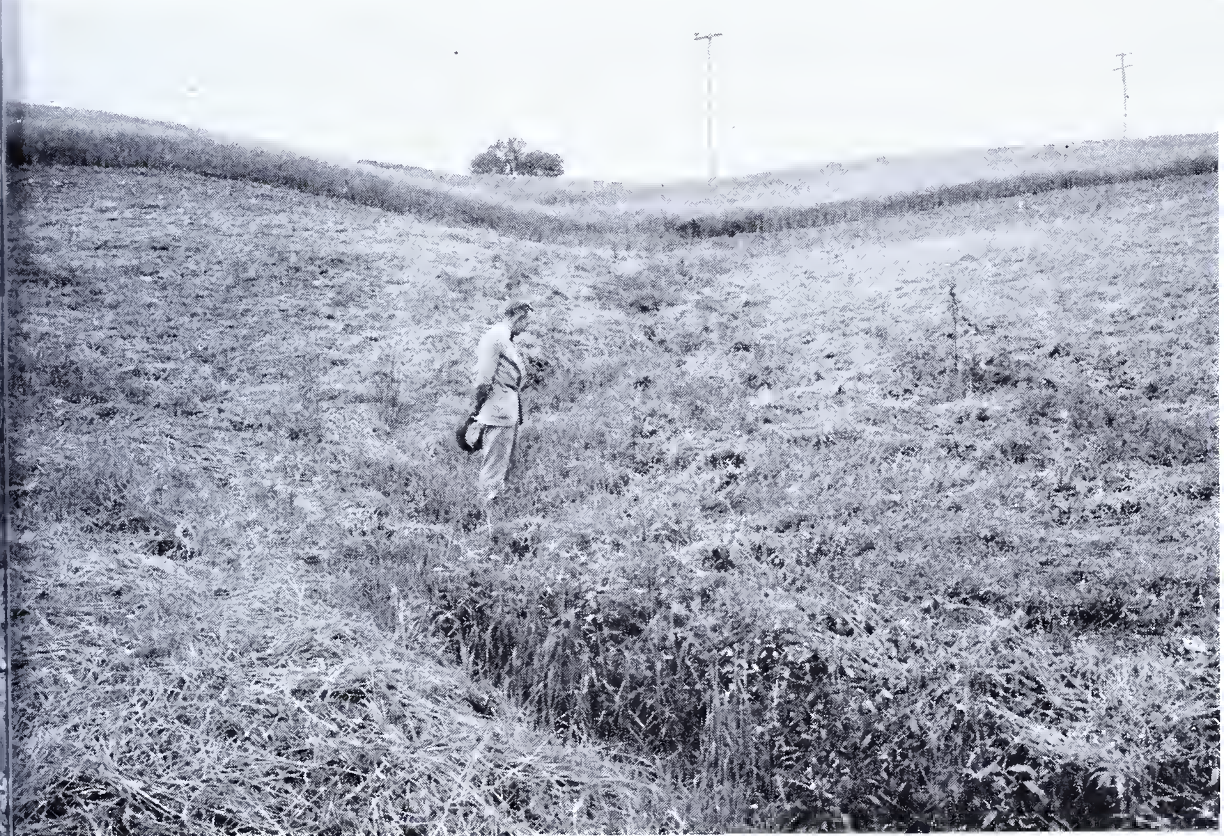
are protected from the surface wash which has devastated this Pennsylvania tobacco field.

Contour plowing, and the maintenance of the soil's organic content are basic principles

on Pennsylvania's most prosperous and productive farms.



A mat of brush laid down in a hillside gully slows the run-off



and accumulates soil on which hardy grasses can take root.

It is sometimes necessary to prepare a spillway

or to lay up a dry wall to control run-off productivity up to the high level reached in the manufacturing industries. "Compared with a 50% increase in farm production, the physical output of manufactured goods in 1939 was some four times its volume at the beginning of the century. . . . The contrast in the behavior of output per worker is somewhat less striking, but still significant. Since 1900 the output per worker in manufacturing has increased twice as fast as in agriculture. If we could compare changes in output per man-hour in the two branches of activity, a sharper contrast would probably result for the available data suggest that the reduction in hours of agricultural labor—per week or per year—have been slight, while similar reductions in manufacturing are known to have been substantial."†

Every procedure which can increase the value of the farmer's work and maintain or improve the value of the farmer's land is an important addition to the present prosperity of our country, and an important assurance as to its strength for meeting every emergency of the future. That this is a matter of vital concern to all of us is shown by the fact that the agricultural output per capita in the United States has steadily declined since 1899.

On Maryland farms where soil conservation practices have been adopted, farmers report an increase in per-acre yield of 25% in their corn crop, 17% in their tomatoes, 18% in their wheat, 15% in clover and timothy hay, 33% in alfalfa, 100% in the number of animals supported on their pastures, and 23% in milk production. Farmers practicing conservation report that their average per acre production goes up 25% after a complete conservation plan has been installed.*

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† American Agriculture—Harold Barger and Hans H. Lansberg, National Bureau of Economic Research.

* "Soil Conservation in Maryland Through Districts," University of Maryland Extension Service, May, 1946.

It is obvious that the productivity of farm work must rise to keep pace with population growth and also with rising standards of living, or food will become scarcer and prices will remain high. The improvement in farm equipment is an important factor in farm production, but machinery can get from the land only what the land has to give. Improperly used, power machinery can hasten soil destruction.

On the other hand, there is much to encourage the American farmer to his best efforts and that is particularly true in Pennsylvania where such a high percentage of farms are operated by their owners, for the testimony of history over thousands of years has been that productivity can be retained indefinitely where the land has been cultivated with care by those who have a personal stake in its future.

The Technical Help Now Available

The control of erosion, retention of surface water in the soil, and the maintenance of soil fertility are at once physical, chemical and biological problems.

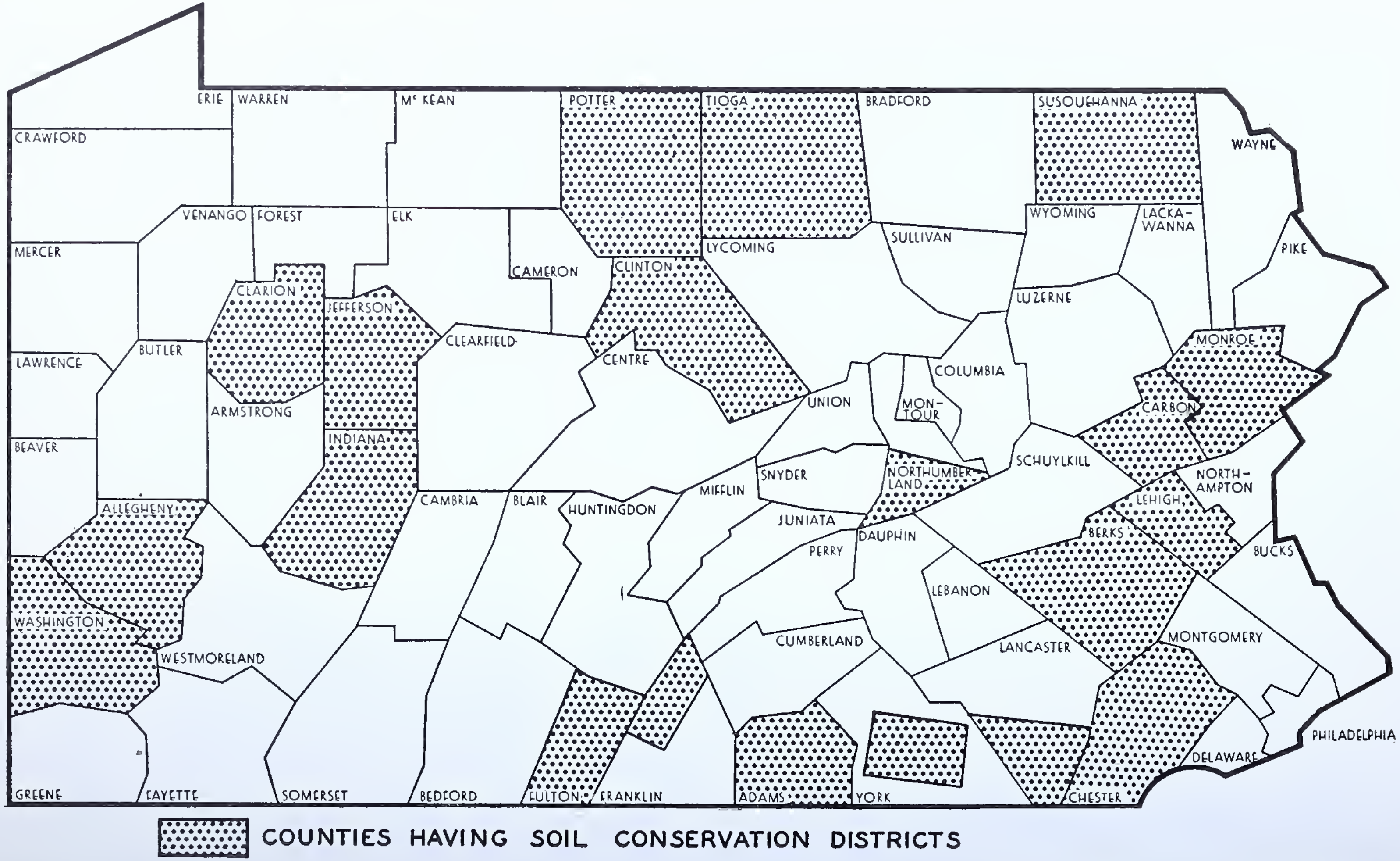
The physical problem has largely been solved by the forestation of steep hillsides, by terracing, contour plowing, and the creation of protective strips, such as hedge rows and bands of forage crops, to prevent rapid run-off of water on moderate slopes. Where the run-off cannot be wholly controlled by these devices, gullies can be protected by sodding or brush, and their banks planted in tough grass. In extreme cases it is sometimes necessary to pave such water channels, or to build dry walls to protect fields from the overflow of improperly drained hills and highways. Information about practical methods of applying all of these measures is available to every Pennsylvania farmer from agencies now actively at work in the State on the problems of soil conservation.

The chemical and biological problems involve proper fertilizing and liming to maintain the mineral content of the soil. The application of these measures naturally depends upon the soil types prevailing on the individual farm. The biological problems are those connected with a scientific program of crop rotation, with the types of planting which will maintain or increase the humus of the soil, and with the determination of those parts of a farm area best suited to field and forage crops and to forest growth. On these points, also, information and technical help is available from both State and Federal agencies, but **the responsibility for the soil on every individual farm rests wholly with the owner of the property.** No State or Federal Act touches that responsibility, or attempts to provide unwanted help in carrying out conservation practices. This is the American attitude toward the responsibilities and privileges of private ownership, and it is not an attitude likely ever to be changed, unless the decline of soil productivity reaches a point where our national welfare is immediately threatened. If that ever happens, it will probably be too late to restore our soil to a condition which will enable us to support our whole population on our own resources.

Only the farmer, himself, acting alone or through the advice and help of existing agencies can insure his own welfare and that of his successors on the land. He has the sole responsibility for its future.

The agricultural income of Pennsylvania stands today at the highest point in history. Now is the time when full advantage can and should be taken of all the existing means for improving the productivity of the 170,000 farms in our Commonwealth.

SOIL CONSERVATION DISTRICTS



SEPTEMBER 15,1947

PENNA. DEPT. OF COMMERCE
STATE PLANNING BOARD

Agencies Promoting Soil Conservation

The Pennsylvania State College

The earliest agency dealing with problems of soil conservation and improvement in the State was The Pennsylvania State College, established in 1855. As an aid in teaching, in 1882, five years before the Agricultural Experiment Station was organized, the Jordan Soil Fertility Plots were laid out. They constitute a most impressive comparison of desirable and destructive soil management practices. Other research in proper soil use has been continuous through the life of the Station. Since 1935 this work has been supplemented by that of the Soil Conservation Experiment Station of the U. S. D. A., also in operation on the College farms. Co-operative investigations yielding a wealth of technical information regarding the loss of soil and water from Pennsylvania land have resulted. In addition, permanent demonstrations of the usefulness of soil conservation practices have been set up.

The Agricultural Extension Service, established over 30 years ago to carry technical agricultural information to the farmers of the State and to assist them in its practical application, recognized problems of soil erosion at an early date. This agency operates through county farm agents in 66 of the 67 counties of the State.

Information on soil erosion control is available on application to the local county agent. Many thousand copies of booklets* giving simplified methods of soil erosion control have been printed and distributed by this Service since 1939.

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* Such as—"How to Reduce Soil Erosion Losses by Strip Farming," "Strip Farming and Other Ways to Reduce Erosion," "Homemade Strip Farming Preventing Soil Erosion," "Simple Systems of Saving Soil, Water, Toil."

The Extension Service conducts instructional meetings at various centers throughout the State and has established soil conservation demonstration areas on selected farms in each of the counties in which its agents operate. The total number of such areas in the State as of February 1, 1947 was 3854. Assistance has been rendered to 5003 farmers in laying out protective strips, and 9782 farmers have engaged in some erosion prevention work as the result of Extension activities.†

The Soil Conservation Districts

As early as 1937, the Pennsylvania Legislature enacted a Conservation District law, permitting the land owners of any section of the State, whether within a single county or not, to petition for the establishment of a Soil Conservation District to be governed by elected supervisors under the general direction of a State Soil Conservation Board.

In 1945 the provisions of this enabling act were altered to enable the Commissioners of any **county** in the Commonwealth to declare the county a Soil Conservation District to be governed by a board of directors appointed by the County Commissioners. This board consists of five members, including one member of the Board of County Commissioners. The other four members are chosen from a list of eight practical farmers nominated by farm organizations which are classed as county wide by the State Soil Conservation Commission. These members receive traveling expenses, but serve without compensation. No new districts can be organized except on a county basis.

The directors have the power to conduct surveys as to soil erosion and the conservation and the improvement of the use of land in their district, to publish the results, and to publicize preventive measures, but all research programs are subject to the approval of the State Soil Conservation Commission, and, to avoid duplication of effort, must be conducted in cooperation with The Pennsylvania State College or some other authorized agency.

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† Paul L. Edinger, Assistant Director of Agricultural Extension Service, The Pennsylvania State College.

The directors may employ necessary personnel, and carry out measures for improving the condition of the soil within their district, after obtaining the written consent of the owner and occupier of any tract of land on which they propose to perform such a service. To the extent of their available funds, they may cooperate with and furnish financial or other aid, including fertilizer, seed and seedlings for erosion control or soil improvement to any occupier of lands in the district on such terms as they may prescribe.

They may acquire, improve, and dispose of land, make available equipment and materials, and in cooperation with The Pennsylvania State College School of Agriculture, and with the approval of the State Soil Conservation Commission, develop and publish comprehensive plans for erosion control in their district.

They may cooperate with other districts and with State agencies.

Such districts once established may be terminated by action of the Board of County Commissioners, after a five-year period.

The County Commissioners are authorized to appropriate money to County Soil Conservation Districts. The State Soil Conservation Commission is authorized to provide assistance to and to coordinate the programs of the several districts, and to apportion among the districts any funds or other assistance allocated for this purpose from State or Federal sources.

To date seventeen County Conservation Districts have been established under the Act of 1945. Portions of four other counties are comprised within districts established under the State Law passed in 1937.

United States Soil Conservation Service

The United States Soil Conservation Service has been actively operating in Pennsylvania since 1935 under the provisions of Federal Law. It was organized at first under the Department of the Interior and transferred later to the Department of Agriculture. This service retains a State Conservationist and a technical staff. The original operations consisted in the setting up of soil conservation projects and demonstrations, carried out with the help of labor from CCC camps. This agency also provided technical services in the analysis of soil and contour conditions of farms within limited areas, and in the demonstration of methods necessary for soil stability. Under its initial program some 3200 Pennsylvania farmers worked out, with the help of technicians from the Department of Agriculture, conservation plans covering the whole area of their farms.

The United States Soil Conservation Service is now confining its services in Pennsylvania to farms within the State's Soil Conservation Districts, but only provides help when such services are requested by application through the board of directors of the districts to the State Soil Conservation Commission.

Cooperation a Prime Necessity

At the present time there are a sufficient number of agencies in the field to assist in the development of a Statewide program of soil conservation. An effective overall result on a matter so important to all of the people of the State will only be possible, however, if the efforts of these various agencies are coordinated to insure effective service from each of them—first, in demonstrating to farmers the value of adopting soil conservation measures; second, in supplying help wherever such help is needed; third, in working out plans for providing the machinery necessary for terracing or other specialized work in run-off control; fourth, in securing the general adoption of such measures as will prevent neglect of one area in the district from exerting harmful effects on other areas in which conservation measures are being adopted.

To this end several coordinate types of activity are essential. These include the preparation of a more detailed soil survey of the Commonwealth than is now available for any but a few limited areas, and in addition an expanded program of agricultural research, both as to fundamental problems and as to the adaptation of our present knowledge to the conditions met with in every part of the State. Such research is the function of the Agricultural Experiment Station of the Pennsylvania State College. Through the County Agents of the Agricultural Extension Service this knowledge is disseminated to the farmers of the State. Through the County Soil Conservation Districts, under the guidance of the Pennsylvania Soil Conservation Commission, each county becomes an effective unit in the effort to improve the productivity and the physical condition of its soil, and the aid of the United States Soil Conservation Service can be enlisted wherever such aid is needed.

A Plan for United Effort

Soil erosion affects everybody. It is one of the most serious threats to the future prosperity of our Nation and our State. It results in the costly silting of our streams and reservoirs. It makes necessary extensive dredging operations to maintain navigable channels for our ports. It increases the cost of our food. It prevents the farmer from receiving a full return from his labor. These are matters so important to the people of this State as to make vital the development of a plan by which every agency in the field of soil conservation shall be fully employed in doing the best work of which it is capable. The recommendations addressed to the Governor and the General Assembly by the Conservation Committee of the Post-War Planning Commission and the State Planning Board were framed with that end in view.*

Early in a study of this problem the Conservation Committee reached the conclusion that the State Soil Conservation Program will never be fully effective until every agricultural county in the Commonwealth has formed itself into a soil conservation district by action of its County Commissioners. A glance at the map on page 18 will show that the progress made since the passage of the County Soil Conservation Districts Act of 1945 has been encouraging but far from satisfactory. A

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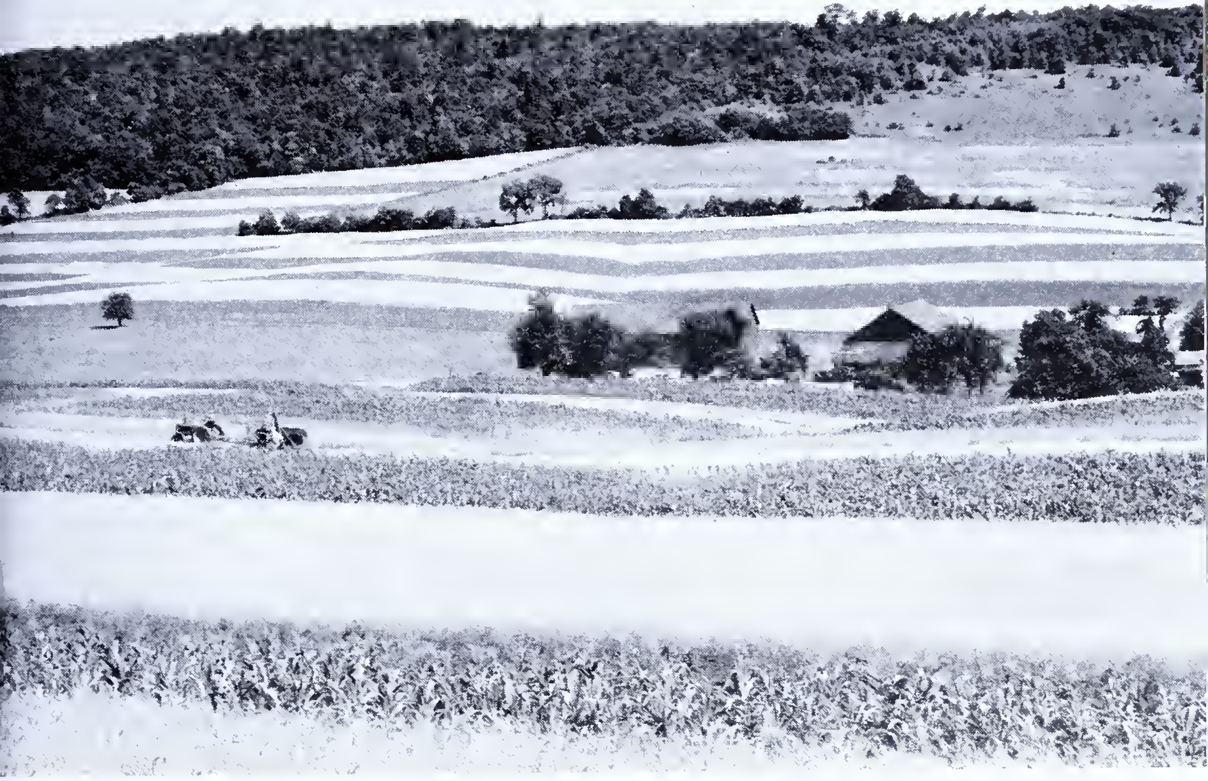
* A Conservation Program for Pennsylvania. (Recommendations of the Conservation Committee of the Post-War Planning Commission and the Pennsylvania State Planning Board.)

The terracing of slopes can usually be accomplished

with normal farm equipment.

This terrace is near completion.

On this one, barley is being sown as a cover crop.



Contour cultivation and the building up of humus through crop rotation

preserve the top soil and retain ground water.

The future of these prosperous and successful Pennsylvania farms

is assured by proper conservation practices.

comparison of the counties in which Soil Conservation Districts have been established with the Soil Erosion map on page 2 makes it evident that a large part of the area of our State in which sheet and gully erosion have become serious problems is not yet included in any Conservation District.

It is obvious that an aggressive campaign is necessary to carry to all the farmers of our State information as to the importance of the Soil Conservation District Program to their welfare. This information must be provided them regardless of their present interest in conservation measures. The County Farm Agents of the Agricultural Extension Service represent the only force now in the field with adequate coverage of all our rural areas to supply this impetus to the program, but attention should be especially directed to the farmers who do not now practice conservation measures and are not convinced of their importance. The Act of 1945 makes soil conservation a policy of the State Government, to be directed entirely through State agencies. It removes from the Soil Conservation District plan all those elements of compulsory action or of Federal interference in State activities which have been obectionable in early laws, yet it makes possible full cooperation with Federal agencies wherever such cooperation is desired.

It is necessary that measures be put into operation to provide conservation knowledge to the general public. More than in any other form of social activity, the success of conservation measures rests on the individual citizen. Everything the State can do will be ineffective if the people of the Commonwealth do not realize the importance of the problem and what they can do as farmers, tree growers, industrialists, voters, or as school children to save vital resources or to put them to their best use. The success of the Conservation Education Laboratory for Teachers* conducted at the Pennsylvania State College during the past two years shows what a new light the facts as to our State's natural resources and the need for protecting them bring to the important problems of the class room. These courses have also demonstrated how serious is the lack of information on this vital theme.

Only one teacher in five hundred has been privileged, as yet, to attend this Laboratory, but the importance of this subject to a State whose prosperity has always depended upon its production of the primary materials of modern life, food, fuel, steel and lumber, to mention only a few, makes it imperative that courses on conservation education be introduced into each State Teachers' College in Pennsylvania as part of the requirement for receiving a degree, or a teacher's certificate.

We suggest that moving pictures be prepared dealing with all the vital phases of this problem. Their presentation by instructors well informed on the whole field of conservation should be scheduled at Teachers' Institutes in all sections of the State.

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* Two sessions of the Conservation Education Laboratory have been conducted in the Summer School of Pennsylvania State College during each of the past two years. The work is intended primarily for teachers in service. Three college credits are granted for the successful completion of the course. Scholarships and financial and technical assistance have been provided by many cooperating public and private agencies including several Departments, Boards and Commissions of the State Government.

If Pennsylvania's agricultural future is to measure up to the opportunities provided by the State's soil and climate, the agencies now engaged in this work must be acting in unison and have a common purpose.

To this end we offer the following recommendations:

1—*That the county farm agents of the Agricultural Extension Service of The Pennsylvania State College, in cooperation with the Pennsylvania Soil Conservation Commission, be entrusted with full responsibility for demonstration of the need for soil conservation practices and for promoting the establishment of Soil Conservation Districts in all the agricultural counties of the Commonwealth.*

2—*That when and wherever such districts are established, the Soil Conservation Commission shall work out and put into effect with the directors of the districts a cooperative arrangement between the Agricultural Extension Service and the United States Soil Conservation Service for such types of technical assistance and material aid as each of these agencies is able to provide to make soil conservation practices in the districts most effective.*

3—*That additional personnel and facilities be provided to enable the Agricultural Experiment Station and the Department of Agronomy of the School of Agriculture, Pennsylvania State College, to expand their program of investigation into the farm problems of the State and the improvement of farm practices, and also to complete the vitally important survey of our soil resources.*

Acknowledgements

Acknowledgement is gratefully made to Dr. S. W. Fletcher, Chairman of the Conservation Committee of the Post-War Planning Commission and the State Planning Board and formerly Dean of the School of Agriculture, Pennsylvania State College, to Dr. F. F. Lininger, Director of the Agricultural Experiment Station of the Pennsylvania State College and to Ivan McKeever, State Conservationist, U. S. Department of Agriculture, for information used in preparing this text, and to the U. S. Soil Conservation Service and the Agricultural Extension Service of the Pennsylvania State College for supplying the photographs used to illustrate this issue on Soil Conservation.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

*1—Preliminary Report. 682 pages, 152 charts, December, 1934.

*10—Drainage Basin Study. 3 vols., 611 pages, 1937.

11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

13—The Pennsylvania Zoning Primer. 1940.

15—Recent Industrial Trends and New Employment Opportunities in Pennsylvania.

16—Retail Trade in Pennsylvania, 1946.

17—Industrial Utility of Water in Pennsylvania. Chemical Character of Surface Water, 1944 to 1946. 1947.

These publications may be seen in representative public libraries. A limited number of those listed are available for distribution until the present supply is exhausted. Those marked with an asterisk are now out of print but may be seen in representative public libraries.

The following issues of **Pennsylvania Planning** are still available.

Local Tax Rates, May-June, 1940.

Community Self-Appraisal (Revised Edition), April, 1942.

Comparative County Data, May, 1942.

Planning and Zoning Progress in Pennsylvania, July, 1942.

Population, October, 1942.

Handicrafts in Post-War Planning, May, 1943.

Plastics, July, 1943.

Air Photographs, February, 1944.

Light Metals and Stainless Steel, August, 1944.

Topographic Mapping Needs, February, 1945. (For limited technical distribution.)

Community Action for Local Self Development, July, 1945.

Conservation, August, 1945.

Forest Resources, November, 1946.

A Conservation Program for Pennsylvania, May, 1947.

WILLIAM I BEVAN ADVISER P-B
SCHOOL BUSINESS
DEPT OF PUBLIC INSTRUCTION
HARRISBURG PA

> "The nation behaves well if it treats the natural resources as assets which it must turn over to the next generation increased, and not impaired in value."
>
> —Theodore Roosevelt

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Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg

Vol. 10 No. 3

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Acknowledgments

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Introduction

During the past twenty-five years a drastic change has occurred in the attitude of our government and public opinion toward the complex problems of World politics. No great nation of the Western World was so nearly self-sufficient and so little internationally-minded as the United States of forty years ago, yet no nation is today so deeply involved in World politics. This change is revolutionary, but it is not generally appreciated that the revolution was not achieved solely by the inventions of Wilbur and Orville Wright, but also by the transformation of the United States from a nation rich in all essential raw materials for 19th Century living to one that in the 20th Century depends for many of its vital products in peace and war on sources often many thousand miles away. Since the First World War this dependence has become increasingly urgent with every passing year.

At the time of that war no serious indications had developed that iron, oil, or soil resources would ever prove inadequate to our National needs, though our dependence on foreign sources for tin and nickel was a considerable handicap. Technological progress over the past thirty years has vastly changed that picture. We are today a deficiency nation in tin for our containers, mercury for our fulminates, lead for bearing metal and paint, tungsten for our billions of incandescent lamps, manganese for steel and dry cell production, chromium essential for high speed and stainless steels, nickel, mica, platinum, long fibre asbestos, quartz crystals, and industrial diamonds, and also the wood pulp for our hungry presses, the copra for our soaps and oleomargarine, the pyrethrum for the control of plant pests, and hundreds of products essential in the alloying of metals, in the treatment of disease and in supplying the conveniences and even the necessities of modern American life.

This growing dependence on foreign resources, due in part to the heavy drains already made on the riches under our own soil and in part to the growing complexity of our lives, compels us to become World-minded. It also compels us to a new attitude toward the mineral wealth of our State and Nation. We realize at last that not even the United States was gifted by nature with the inexhaustible purse of Old Fortunatus. We are not at the bottom of the barrel, and if we are wise we never will be. But, we are already beginning to appreciate the fact that there is a bottom to the barrel of our National wealth, that we have already eaten the largest apples, and that we shall have to reach further and further every year to satisfy the hungry appetite of our industry for the materials we once believed to be inexhaustible.

It is out of this realization that we have come at last to consider the necessity for the wisest possible use of all the great gifts which nature once showered so liberally upon our land.

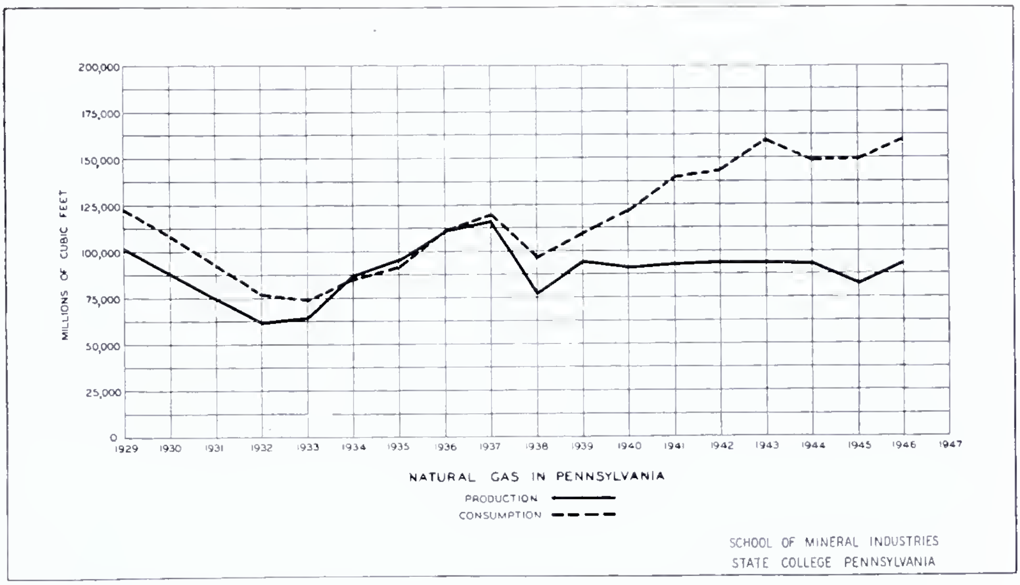
The Problems of Mineral Conservation

Our civilization and the strength of our Country, in peace and in war, depend on the full utilization of the oil, coal, the natural gas, and the many metals and earth-products hidden under American soil, and hidden with peculiar richness under the soil of Pennsylvania. These gifts of nature must be used to maintain our civilization.

The conservation of mineral resources is therefore obviously impossible, if one means, by that term, not using the available material for self-protection or the creation of industrial wealth. Human nature is not so constructed that it can deny itself whatever is regarded as essential to comfort or safety. Yet it is for this very reason that mineral conservation assumes its greatest importance. Oil and natural gas are present in the earth only in limited areas. Millions of years were required for the accumulation of these deposits, which are now being used in prodigious quantities and at a growing rate of consumption. The United States is exhausting its oil reserves far more rapidly than is any other great nation. With 31 percent of the world's reserves, we are supplying 63 percent of the world's demands for liquid fuel. The richest sources of American iron ore and coking coal are also becoming rapidly depleted, though iron forms a considerable percentage of the crust of the earth, and there are bituminous coal reserves adequate to supply fuel at the present level of demand for more than a thousand years, if price is no consideration.

It can be safely said that in no part of the world, except possibly Siberia, Northern Canada, Alaska, the Antarctic, and the hinterlands of Brazil, are there important known mineral deposits from which the richest and most accessible contents have not already been largely exhausted. What is left will come harder, and will involve greater labor in discovery, extraction, and refining. It is likely to cost more. The cream has already been skimmed off the natural resources of the earth, by the activities of the past two generations.

To this statement one important exception has to be made. Modern technology has developed a demand for minerals which, until recent years, have been of little worth. Some of the metals now coming prominently into use have sources which for practical purposes may be considered inexhaustible. Aluminum, one of the rare and precious metals two generations ago, has now become an important and indeed a vital industrial material. It is at present obtained chiefly from bauxite, of which a considerable part is imported from British Guiana. Research has, however, already developed the possibility of obtaining aluminum from the high alumina clays, of which prodigious quantities are available for future use. Magnesium, employed for years chiefly as a flashlight powder in photography and pyrotechnics, has become an essential industrial material because of its extreme lightness and its high strength-weight ratio. An important source of this metal, so vital in the construction of airplanes, is the dolomitic limestones. The metal is also commercially extracted from the brine of salt wells and from sea water. Together with glass obtainable in unlimited quantities from sand and limestone, these two metals may readily supply man with many of the structural and industrial materials needed in the arts of peace. The transition to such a technology would be likely to change the industrial pattern of our Nation, with far-reaching consequences on the distribution of population and wealth. Whether or not this change ever occurs the fact remains that our present economy, built upon iron, steel, coal,

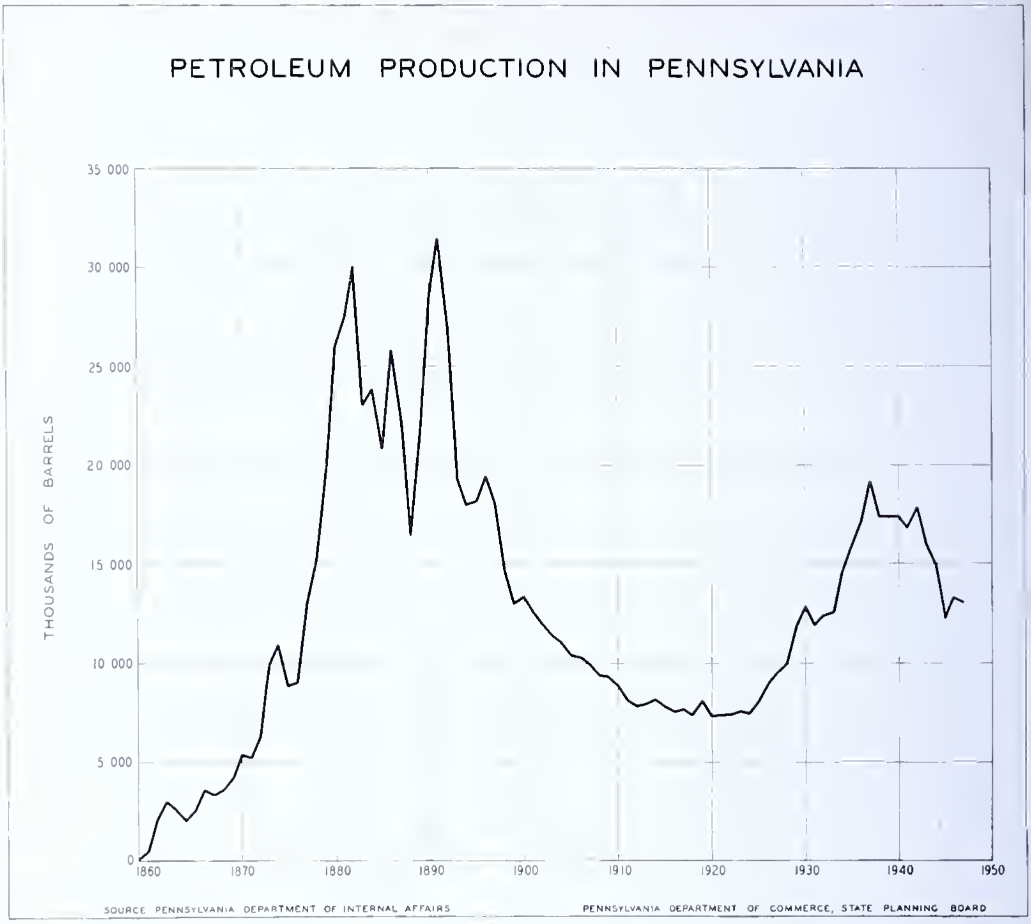


NATURAL GAS IN PENNSYLVANIA

SCHOOL OF MINERAL INDUSTRIES
STATE COLLEGE PENNSYLVANIA

petroleum, and natural gas, must in the future depend on less available and more costly resources to supply itself with the ferrous and many of the nonferrous metals and with liquid and gaseous fuel. That this is true is a matter of profound importance to our Commonwealth.

In 1946 the metals industries of Pennsylvania produced steel products, alloys, nonferrous metals, machinery, and consumers goods valued at $4,590,000,000. The chemical industries, whose chief products are derived from coal and petroleum, added another $1,008,000,000. Our coal mines, our iron mines, our petroleum and natural gas wells, and our cement and stone quarries yielded a product of $1,254,000,000. So that in that first full year of peace $6,852,000,000 of materials produced by Pennsylvania's industries grew directly from the State's or the Nation's mineral resources. No other state can even approximate that record. Pennsylvania's concern with its own minerals and with those of the Nation is, therefore, profoundly justified. Our whole economy depends for its chief source of support on things dug out of the ground or pumped from the oil and gas wells. Yet the record provided by the summaries given on page 9 reveals the fact that the State's output of most of the primary sources of its wealth has declined markedly during the past thirty years.



PETROLEUM PRODUCTION IN PENNSYLVANIA

SOURCE PENNSYLVANIA DEPARTMENT OF INTERNAL AFFAIRS

PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

During the five-year period from 1915 to 1919, which included the years of the First World War, both bituminous and anthracite production in Pennsylvania reached a peak which they have never since attained. In 1891 the production of our oil wells was 31,424,000 barrels. From that year, the all-time high, the decline was rapid and disastrous. During the First World War, Pennsylvania's oil production had dropped to approximately 7,500,000 barrels, one-fourth of the output of thirty-five years before. In 1921, when production had fallen to 7,418,000 barrels, the State Legislature authorized the use of water-flooding. This proved a measure of extreme importance to the prosperity of our apparently exhausted oil fields, Through the injection of water at high pressure into the oil sands, Pennsylvania's output began again to rise, reaching in 1937, an output of 19,189,000 barrels. The Pennsylvania grade of crude oil is the richest known source of lubricants, and hence in great demand in a period of high industrial activity, but, during the Second World War, when the demand for lubricants was at its peak, the Pennsylvania wells were not able to repeat their performance of the five prewar years. The output in 1945 and 1946 was lower than the 1930-1934 average, and well below the average of the preceding decade.

Despite the very heavy industrial demand for natural gas in the glass and carbon industries and its use as a preferred industrial and domestic fuel, the State's output during the Second World War was lower than in any period in the preceding thirty years, except the first four years of the 1930 depression.

It is toward facing these facts and their consequences that this issue of "Pennsylvania Planning" is directed.

Pennsylvania Minerals Production

5-YEAR AVERAGES—1900-1946

	Bituminous Net Tons	*Anthracite Net Tons*	*Petroleum Bbl. (42 Gal.)*	*Natural Gas M Cu. Ft.*
1900-1904	92,415,174	62,925,190	12,085,676	—
1905-1909	129,919,324	80,122,004	9,883,424	132,962,685*
1910-1914	154,128,174	88,368,929	8,193,881	115,498,305
1915-1919	164,384,274	92,949,404	7,741,822	122,863,281
1920-1924	137,518,469	82,767,194	7,475,200	106,326,400
1925-1929	138,171,102	74,422,791	9,672,000	103,169,500
1930-1934	92,434,186	56,739,997	12,841,800	74,986,200
1935-1939	95,360,450	50,998,528	17,375,400	98,236,600
1940-1944	133,178,293*	57,606,516*	16,417,400*	97,374,600*
1945-1946	127,141,962**	58,939,975**	12,717,000**	—

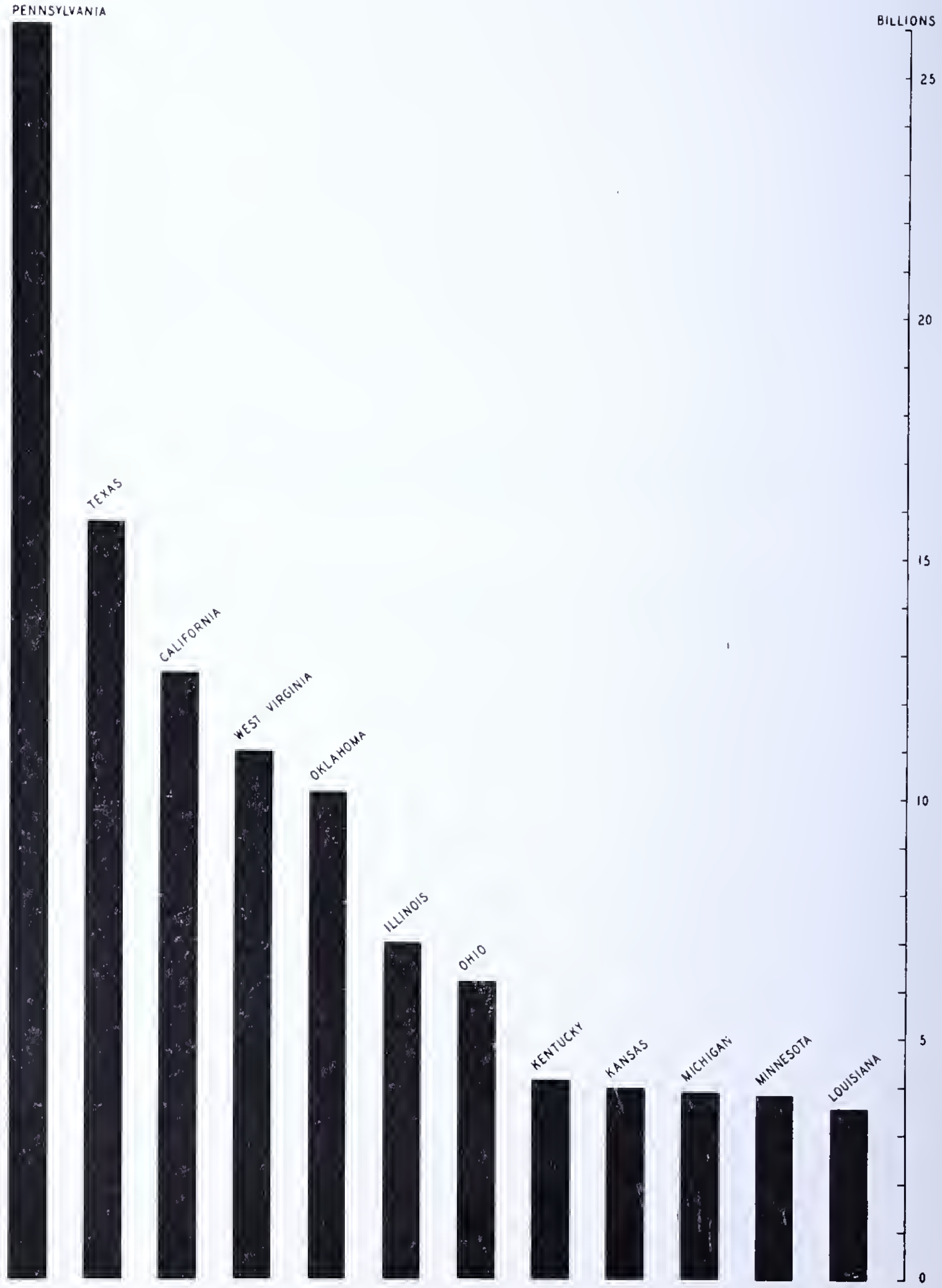
Source: "Minerals Yearbook," U. S. Department of the Interior, Bureau of Mines.

* 4-year average.

** 2-year average.

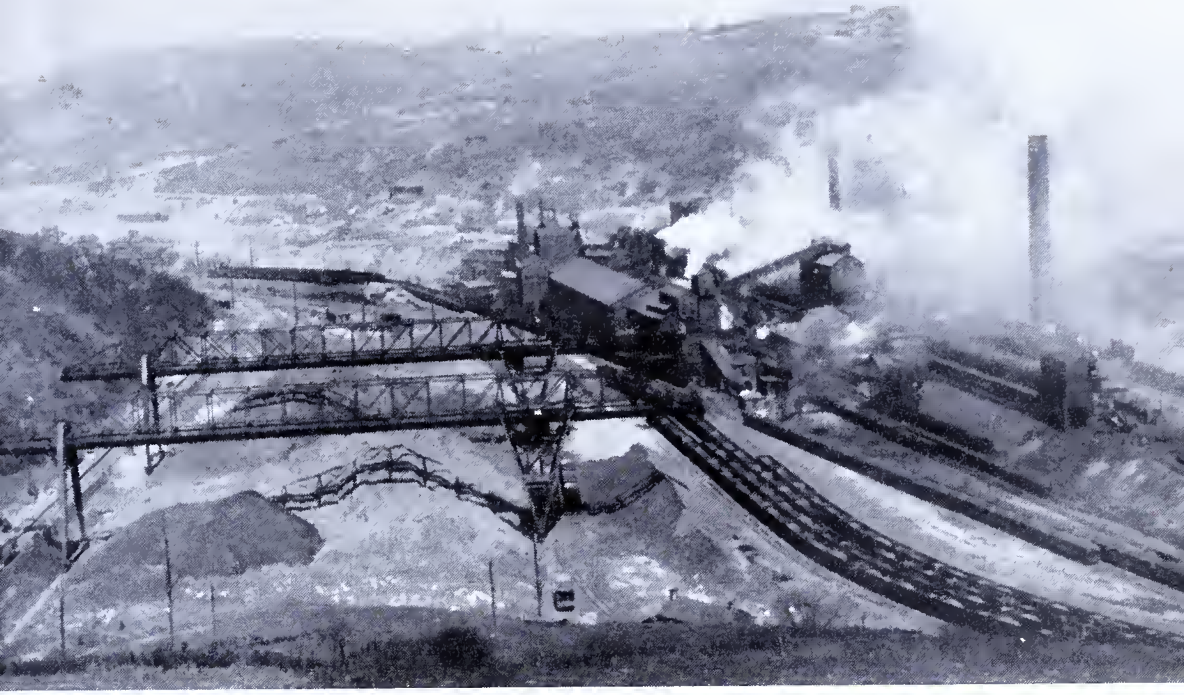
VALUE OF MINERAL PRODUCTION
1911–1945

12 LEADING STATES



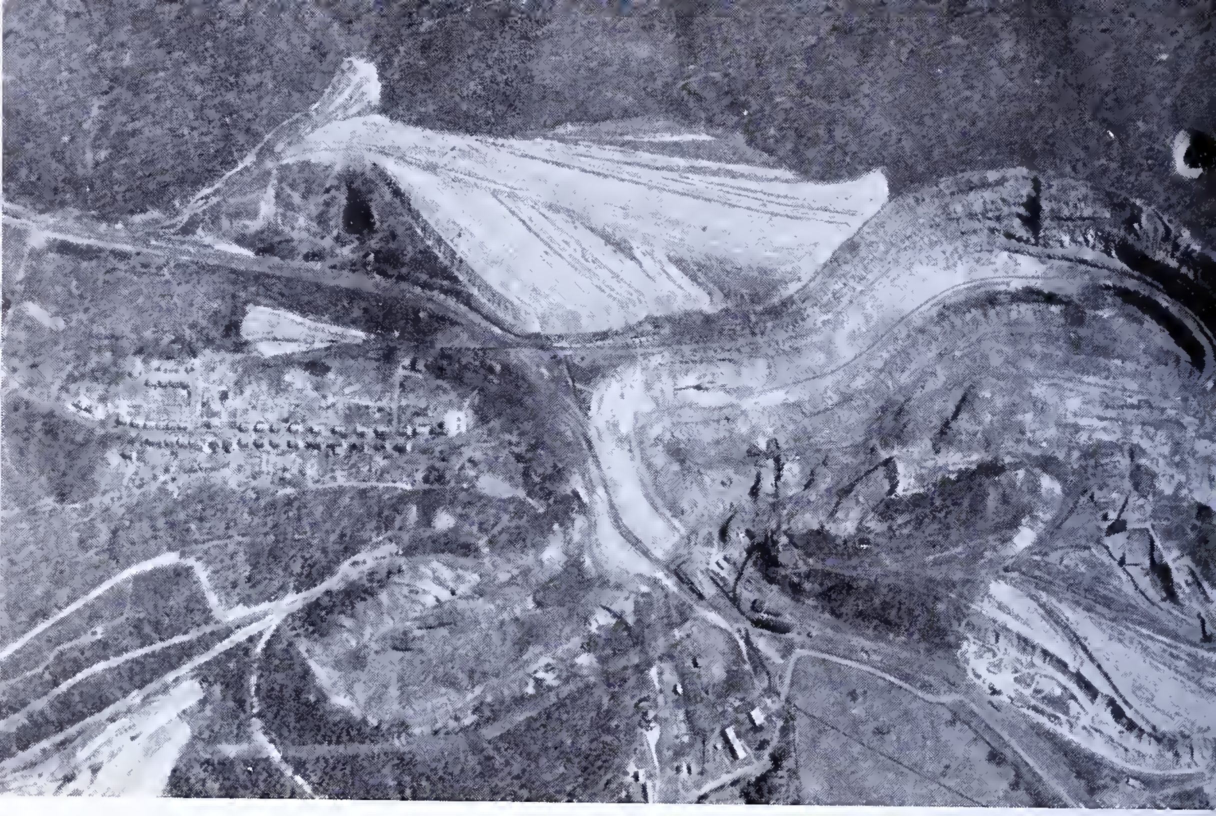
DATA SOURCE U S BUREAU OF MINES

PENNSYLVANIA DEPARTMENT OF COMMERCE STATE PLANNING BOARD



Great industries have developed

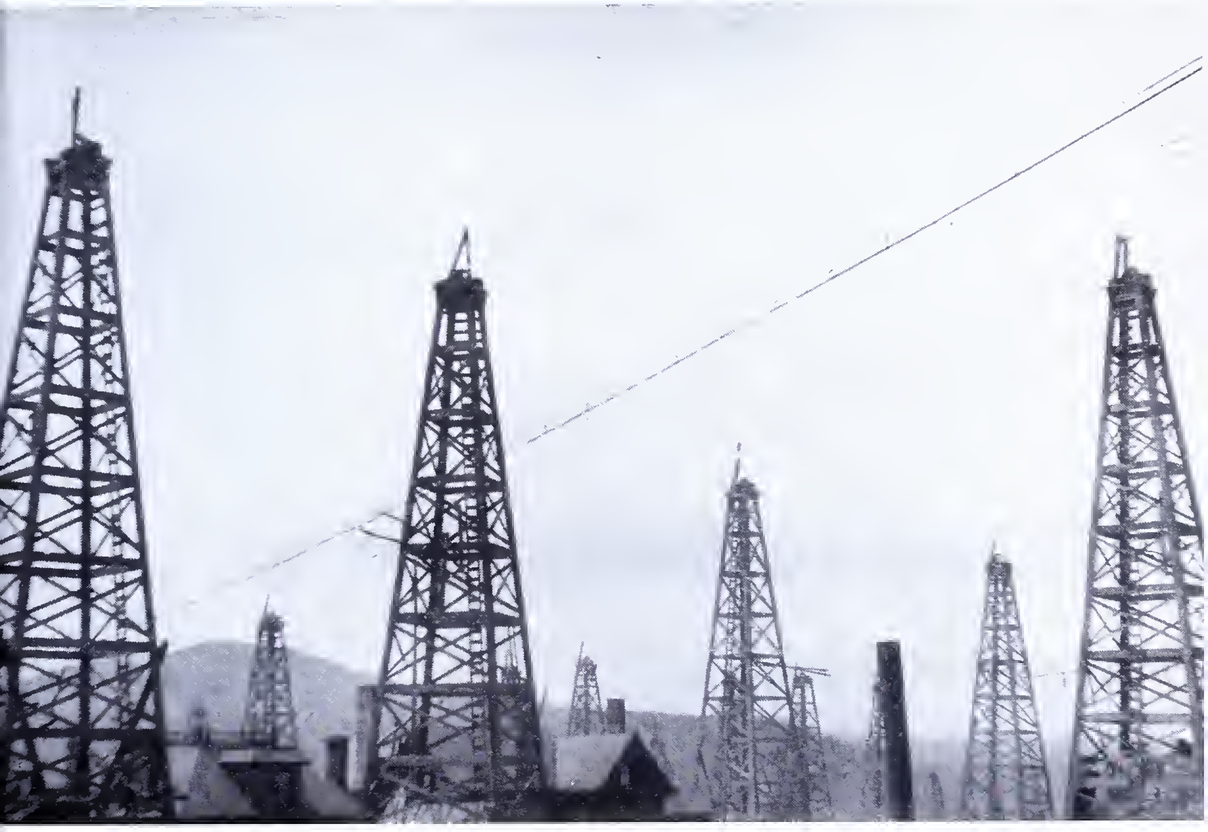
from Pennsylvania's mineral resources.



From high in the air, or at the edge of its ore pit

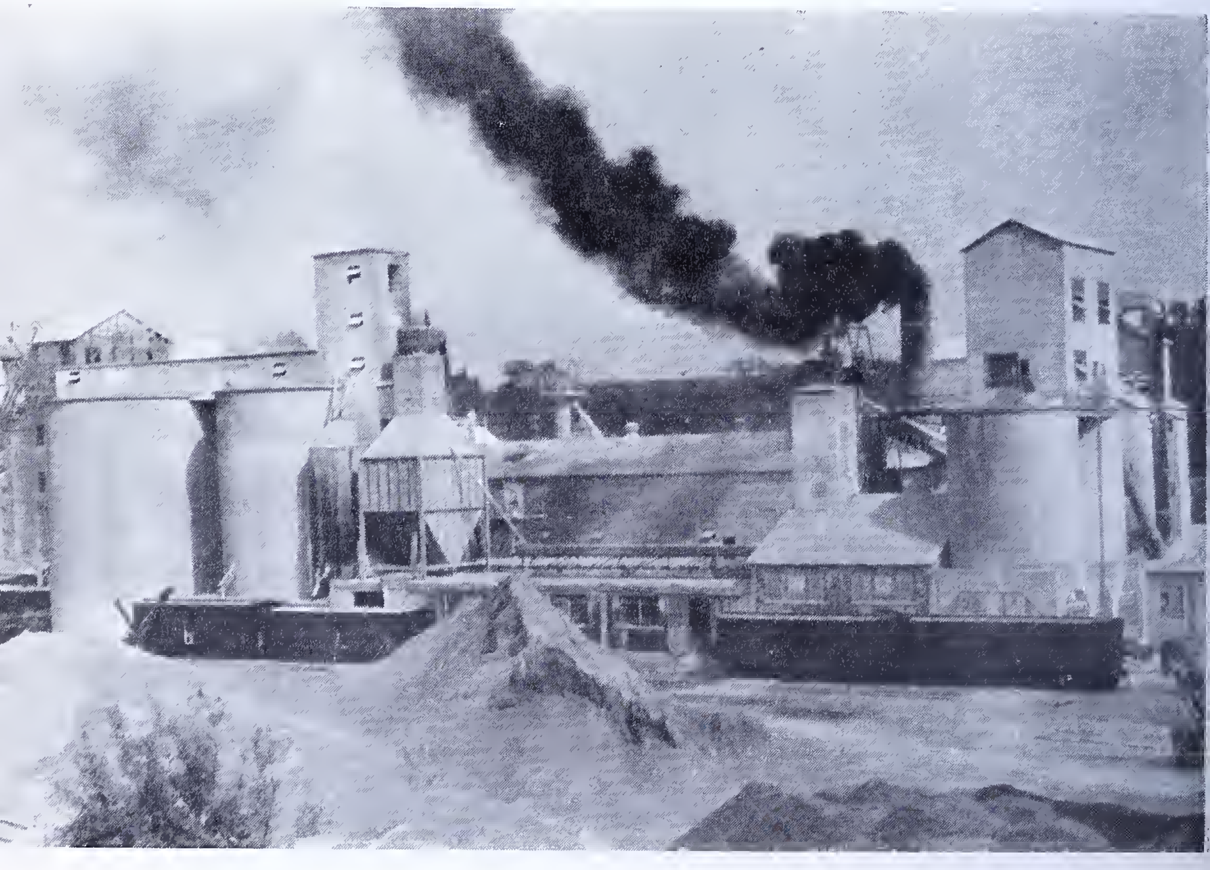
Pennsylvania's great Cornwall iron mine is equally impressive.

Drake's historic oil well near Titusville



is the birthplace of one of the World's most vital industries.

On the State's vast deposits of limestone



our lime and cement plants depend for their raw material.

Waste—The Scattering of Resources

What is waste? From the point of view of mineral resources, which in their nature are practically indestructible, it means the unnecessary dispersal of a material which is valuable only in a concentrated or pure form. Pennsylvania topsoil is worth several dollars a ton. Clear mountain water sells in the State's big cities for ten cents a gallon. Mix the two together in a creek or river bed and the resulting product is worth literally nothing. Add to the mixture a portion of the fine coal dust, which could be used for generating heat in a municipal power plant, then add the various hydrocarbons of human and animal waste, and the dark, muddy liquid produced is not merely worthless, it is an actual offense to the communities through which it flows.

When water falls as rain or snow at the head of a watershed, it is an almost pure chemical compound, though a small percentage of the free nitrogen in the air is absorbed by it before it strikes the earth. It is a mineral resource essential to animal and vegetable life, and vital to every type of industry. In its passage into our surface streams, this rain water dissolves chemicals from the rocks and may accumulate sediment from clay, or color from vegetation, but it is not until it passes through inhabited regions that any serious admixture of harmful elements is likely to occur.

The more densely inhabited the area and the more highly industrialized, the richer this mixture of water with chemical and animal wastes is certain to become. Despite all the sedimentation and aeration in the flow of a running stream, the further down the river one goes, the less the material flowing between its banks resembles the clear, sparkling stuff which first fell on the earth as rain. It can be called water, by courtesy only, long before it reaches the sea.

In short, through human and industrial use, water is degraded by admixture until at length the resulting compound is no longer fit to be drunk by men, or to be used in the boilers of steam plants, or as the basis for chemical processes. It even becomes too corrosive to be safe for navigation. Practically every element which enters into the degradation of water has an important human use. Mixed together in an indiscriminate and heedless fashion, the resulting product is made useful only by elaborate chemical and physical treatment.

Something very similar to this process of the degradation of essential materials and their ultimate loss to human use occurs in the case of practically every one of the some seventy elements now valuable to man. Fortunately, in the case of water, nature is constantly renewing our supply and just as constantly submitting its pure product to corruption by human agencies into something unfit for human use. Fortunately also, we now know ways to prevent this degradation of water. It is quite possible through the expenditure of a sum of money approximately one-tenth that contemplated in 1948 for the National Defense to restore our streams to a usable purity and make them suitable for domestic water supply, for recreation, and as a raw material for industry.

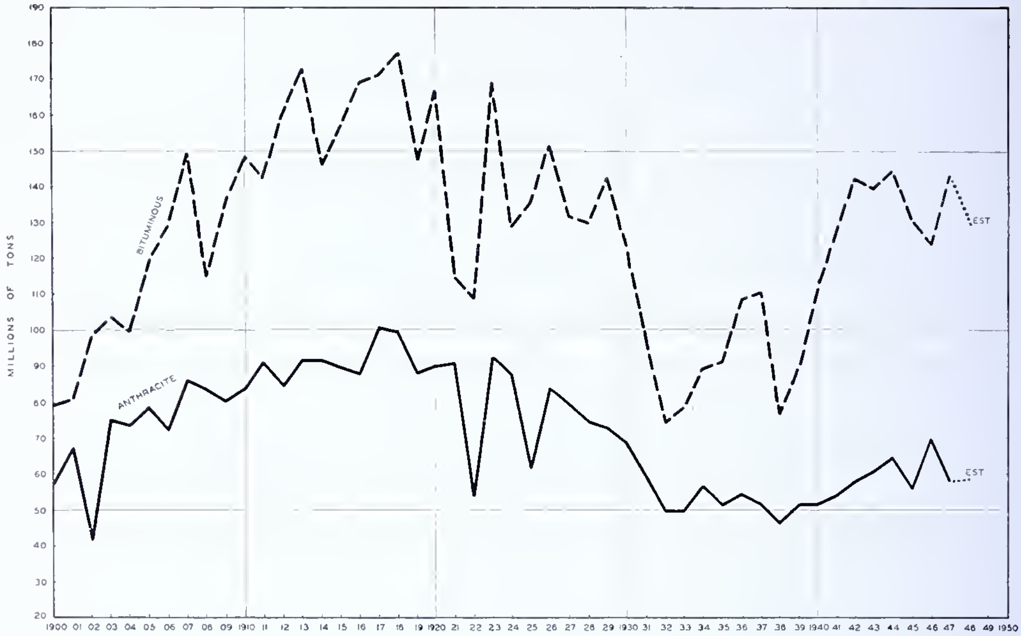
Though nature supplies the power which lifts water into our hills and sends it back down the channels of our rivers, we have so hastened stream flow by cutting down the forests at the headwaters of our creeks and rivers that the irregularity of flow has been greatly increased through human interference with the protections afforded by nature. Here, too, we have abundant information as to means by which we can assure ourselves a more steady and safe supply. The problems of water are solvable at relatively little cost.

About other materials we are not so fortunate. The future of coal, iron, oil, and more than a dozen other minerals, essential to civilization as we know it today, is by no means so assured. As easily available resources some of them may not outlast the life of the present generation. During the Second World War, to a much greater extent than during the first, the American people became aware that the means for supplying many supposed necessities of modern life were not adequate to the combined civilian and military needs. Today, we realize that they are not fully adequate to the combined needs of domestic peace and European reconstruction. To continue to enjoy life as we have known it, in the face of the uncertain future of a world whose confusion is now more widespread than ever before, the American people must at last learn how to save their invaluable assets through more economical methods of use, of extraction, and recovery, since all their precious minerals, once scattered and dispersed into useless forms can never be replaced from the treasury of nature.

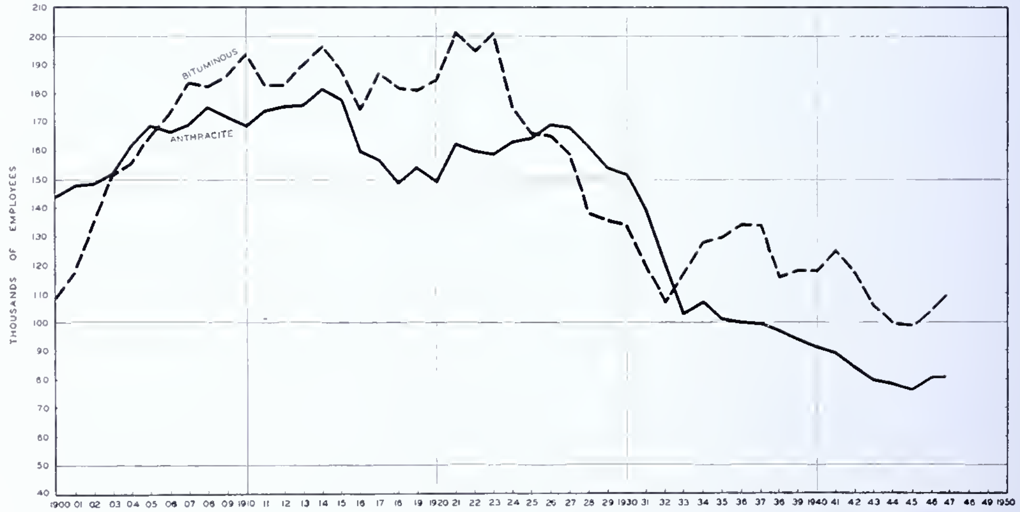
Many years ago Sir William Thomson, afterwards Lord Kelvin, and probably the greatest physicist of his generation, said: "If the whole crust of the earth were ground up and sifted and all its minerals evenly distributed throughout the entire mass, the result would be an utterly worthless material." Such a mixture would provide neither man nor higher forms of vegetation with the substances necessary for life.

Waste, then, is fundamentally a scattering or degradation of resources without some compensating benefit. This applies as much to the careless mining of coal, to the wanton burning of stands of timber in a forest fire, to the faulty engineering which permits a gushing oil well to exhaust its pressure or scatter burning oil over acres of ground, to the dark pollution of our rivers, to the wasting of our topsoil through careless methods of farming, or to the sooty cloud which hangs over so many great industrial cities. The smoke in the air of a manufacturing town, blackening paint, depreciating property values, discouraging residence, represents millions of dollars worth of primary raw materials which could, and should, be saved and used.

PRODUCTION OF ANTHRACITE AND BITUMINOUS COAL IN PENNSYLVANIA



EMPLOYMENT IN ANTHRACITE AND BITUMINOUS COAL MINING IN PENNSYLVANIA



PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

The production of anthracite and bituminous coal in Pennsylvania reached its highest point during the First World War. (In the depression of the 1930's both output and employment declined approximately fifty percent.) Because of competitive fuels and the more efficient utilization of coal, demand and employment during the Second World War never even approximated the earlier peak, as will be seen from the chart above. The trend in employment has been much more sharply down in recent years than that of production, due to improved processes of mining.

The Losses of the Past

It is estimated by Dever C. Ashmead,[1] of the Pennsylvania Geological Survey, that the original content of all the Pennsylvania anthracite fields was 23,060,000,000 net tons. Up to 1934, 4,494,000,000 tons had been recovered. Approximately 2,952,000,000 tons were lost or wasted. Of the total coal remaining, 8,278,000,000 tons are recoverable.

Anthracite exists in Pennsylvania in four fairly distinct and separate fields. The life of the Northern field, at the recent rates of consumption, is approximately 46 years; of the Eastern middle field, about 10 years; of the Western middle field, 148 years; and of the Southern field, more than 520 years.[2] These figures are, of course, statistical estimates which will never exactly express the conditions of the future. The smaller the demand for anthracite, the longer the various fields will last, but that fact would be no comfort to the people of the several counties in which anthracite mining and its derivative industries are the chief source of wealth and employment.

That a tonnage equal to 40 percent of all coal ever recovered must be figured as lost in mining and that a second great loss has occurred in the processing of coal was the price paid for the rapid development of America's industrial power.

How great these now preventable losses have been is illustrated by the fact that between 1936 and 1948 dredges operating in the Schuylkill and Susquehanna Rivers have recovered 12,000,000 tons of anthracite which had drifted down stream from the breakers and that the "washery" production from the old culm banks totals 174,000,000 tons in the past forty-seven years.

The amount recovered by dredges from the river bed, where the coal is mixed with silt and topsoil washed down in spring freshets, can represent only a small percentage of the actual loss. That coal has become, in the lower rivers, a peril to navigation. It has obstructed stream flow, and made more serious the flood hazards along the river's shores. These losses are no longer necessary. To a considerable measure, they are now being prevented under the stream clearance law of the Commonwealth.[3] Fine coal is being recovered through mechanical processes, or caught in settling basins close to the breakers, and it is not likely that the mines will, in the future, allow very much anthracite, of even the smallest sizes, to get away from them.

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[1] Pennsylvania's Mineral Heritage, page 86.

[2] George H. Ashley: "Coal" in Pennsylvania's Mineral Heritage, page 85.

Several large power plants have been designed for the use of fine sizes of anthracite such as number four and five buckwheat, silt, and slush. The success of these large installations has marked a new phase in the use of those grades of anthracite which, until very lately, were a waste product of the mining of the domestic sizes.

Another important development in the utilization of fine or powder sizes of anthracite has been an increase in late years in the production and sale of fuel briquets. In 1946, 2,841,000 tons of this fuel were manufactured, largely from surplus anthracite fines, yard screenings, and low volatile bituminous coal, with the use of asphalt, lignin, or coal tar pitch binders. The value exceeded $25,299,000. Pennsylvania is the second most important state in this type of production. Since such briquets are generally retailed at a lower price than standard sizes of anthracite, it is possible that this method of utilizing what has largely been a waste product may develop greater importance in the near future.

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[3] Laws of Pennsylvania, 1945 P. L. 435.

The Cost of Our Prodigality

No recent estimates have been made as to the quantity of waste anthracite now deposited in the river beds of our State. Twenty years ago in a study of "Anthracite Culm and Silt,"[4] the guess was hazarded that at least 900,000,000 tons of waste material, with a sufficient carbon content to make it profitable for future recovery, then existed in Pennsylvania's stream beds. In the same year the accumulation of culm and silt stored in the waste banks throughout the hard coal region was estimated as more than 214,000,000 gross tons, 20 to 80 percent of which was combustible.

In a survey made by the United States Army Engineers in 1946 it was estimated that to clean up the bed of the Schuylkill River 30,000,000 cubic yards of culm would have to be removed. This is true despite the fact that the average quantity of waste dredged annually from the Schuylkill and Delaware River channels has been 1,200,000 cubic yards, of which 500,000 was removed from the Schuylkill River. The Army report, dealing with the effect of the mine waste now carried by the Schuylkill, particularly stresses the increase in flood hazards due to the loss of water-carrying ability of a river bed choked by this long accumulation of deposits from the anthracite mines. "Obstruction of the channel and floodway by the great mass of culm has reduced the hydraulic capacity with the result that flood heights have increased with corresponding increase in flood hazards and flood damages." "Historically," the report continues, "the Schuylkill was a stream of beauty and aesthetic appeal and an inspiration to artists and writers.

. . . "In its present condition, the large percentage of fine anthracite and the solids carried by the water and blanketing the banks and floodway give a black, foul, and repugnant appearance. Due to its uninviting aspect and the excessive shoals of its channel, recreational use of the river is now inconsequential."[5]

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[4] James D. Sisler, Thomas Fraser and Dever C. Ashmead.

In Philadelphia, from Fairmount Dam to Passyunk Avenue, 53 percent of the material which now forms the river bottom is anthracite mine waste, and from Passyunk Avenue Bridge to the mouth of the river, 42 percent.

These enormous accumulations of wasted fuel which impair usefulness and beauty of our streams were due partly to imperfect methods of mining and processing and also, in part, to the great haste of our development of resources, which at one time seemed inexhaustible. That confidence was an illusion of our industrial youth. We know now that if we fail to take every precaution against such avoidable losses the future of the Commonwealth may be seriously threatened within a period of years no greater than a man considers important when he takes out a personal life insurance policy.

Anthracite, the one important mineral in which Pennsylvania has a virtual monopoly in the Western World, has been considered here rather as a typical than as the worst example of losses occurring in the recovery and processing of our mineral fuels. In a survey of the bituminous coal resources of the United States, compiled by Thomas A. Hendricks of the United States Geological Survey,[6] the total of bituminous coal produced through 1943 was 20,897,959,000 net tons. The total lost in mining during the same period was 11,105,175,000 net tons. The coal lost was estimated to be 34.7 percent of the coal as in the ground, or 53.14 percent of the coal produced.

Many of the factors which led to the heavy losses experienced in the production of coal were dealt with by the Honorable Richard Maize, Secretary of Mines of the Commonwealth, in an address before the Pennsylvania Conservation Education Conference at State College in 1946. Speaking of conditions in the bituminous coal fields of Pennsylvania, he said:

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[5] Chief of Engineers, United States Army, House Document 529, 79th Congress, 1946.

[6] Transactions of the Sixth Annual Anthracite Conference of Lehigh University, page 51.

"In the early days of mining, before the introduction of mining machines the percentage of coal recovered was not very great. Coal was taken from the mines in which the cover was comparatively light. Lump coal was in demand and coal smaller than minus three-quarter inch was difficult to dispose of. To keep mines in operation the operator was compelled to waste these smaller sizes. If a pillar were squeezed or crushed it was left unmined. It was believed in those days that coal was so abundant that the loss in ribs, stumps and chain or barrier pillars was of little consequence.

"Mining machines were introduced into Pennsylvania about 1884. These machines were of the air-driven puncher type, which cut a kerf about 12 inches high on the front, tapering to less than 3 inches on the back, and about 5½ feet deep. The miners, as a rule, were paid for all the coal which passed over the screen having horizontal bars 1¼ inches apart, the screening area being about 48 square feet, and the coal had to be larger than nut size to pass over the screens. As a result, all the fines or undercuttings were shoveled into the gob.

"Later came the chain breast machine, which cuts a kerf of from 4 to 5 inches in height. The cuttings or fines were much finer than those caused by the punching machine, and they also went into the gob.

"A change of contract between the United Mine Workers of America and the mine operators, whereby the miners were paid on a run-of-mine basis, instead of for the coal which passed over the screen, cut down the losses because the fines which were previously shoveled into the gob were now loaded into the mine car, and the miners paid therefor."[7]

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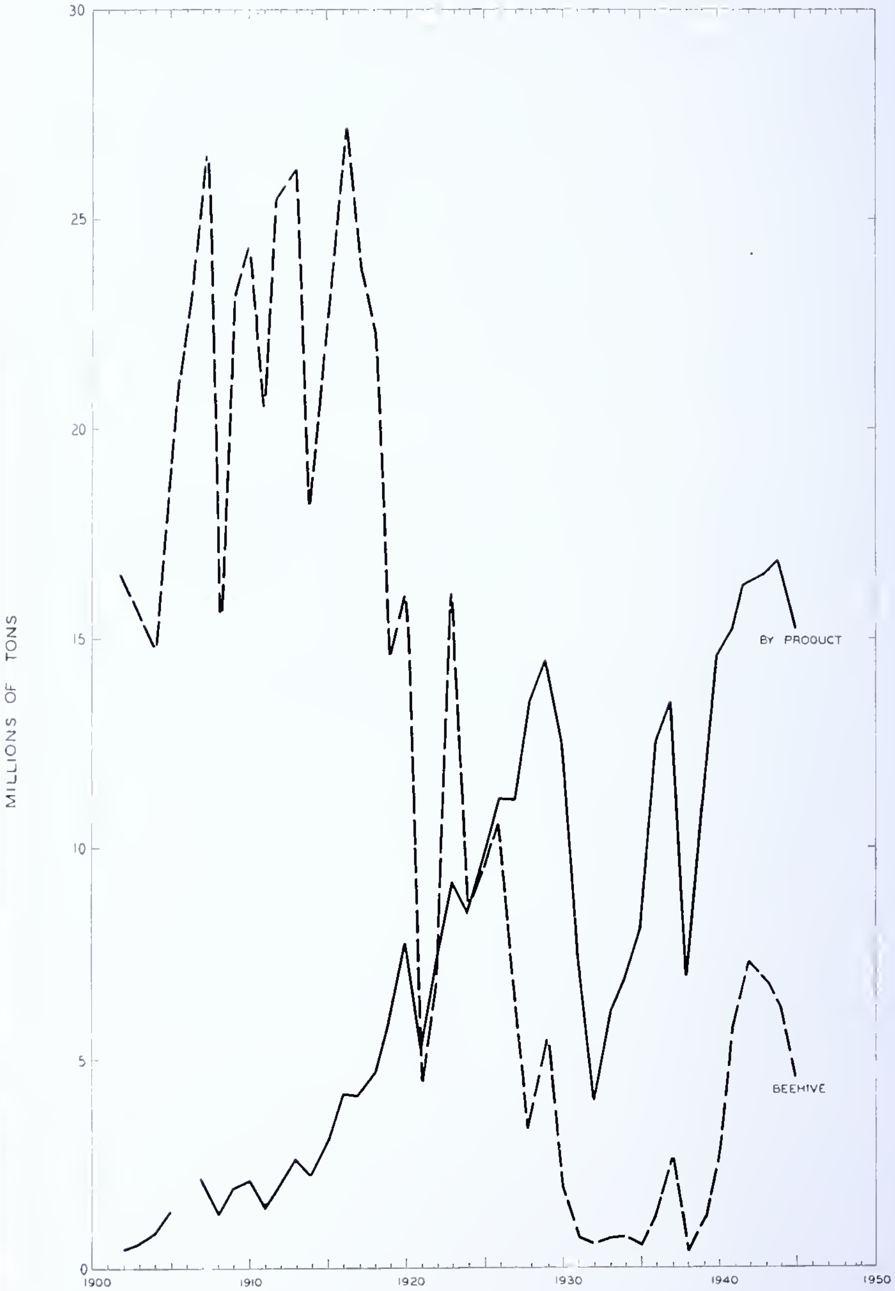
[7] "Coal Conservation Requirements of Pennsylvania," Richard Maize, 1946.

COKE PRODUCTION IN PENNSYLVANIA



SOURCE U S MINERALS YEARBOOK

PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

The Problem of Mine Water

Losses in extraction and processing do not, unfortunately, tell the whole story of the declining basic wealth of our industrial civilization. In an area of abundant rainfall every deep hole in the earth eventually fills up with water. This is true in Pennsylvania. As mines have gone deeper in both anthracite and bituminous areas, but particularly in the former, the pumping of water out of the lower workings has become a major problem. A few salient facts from a study of mine water made in 1941 by S. H. Ash, District Engineer of the United States Bureau of Mines,[8] will illustrate the gravity of the problem.

During 1939 four large coal companies in Lackawanna and Luzerne Counties (the Northern Field) pumped 78,483,000,000 gallons of water from a depth of from 300 to 1200 feet in order to maintain their workings. In that field, in 1937, it was estimated that 33 tons of water were pumped for each ton of anthracite produced. In the Western Middle Field, out of a total rainfall in the field area of 92,000,000,000 gallons, nearly 66,500,000,000 gallons, or 72.2 percent, of the rainfall had to be pumped out of the mines—48 percent of the total from operating mines and 52 percent from idle mines. In the Southern Field the total water pumped in Mine Inspection District 7 was 39.4 percent of the rainfall. As a consequence of water flooding much coal has been permanently lost. The abandonment of a worked-out mine without provision for maintaining pumping operations may lead to the flooding of adjacent active workings, the deterioration of their ceilings and timbers, and consequent permanent losses of both production and employment. While it is not likely that infiltration of water into mines

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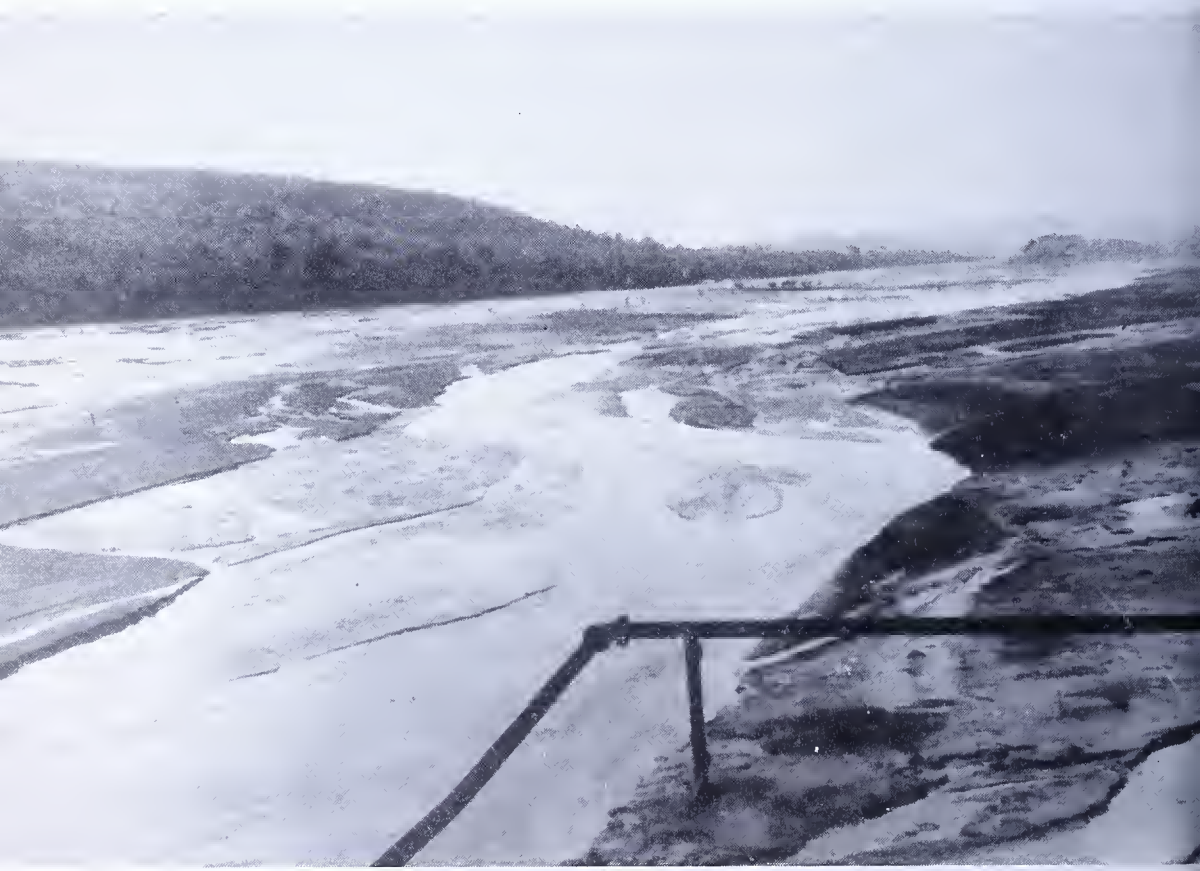
[8] "Water—Chief Problem in Anthracite Mining," S. H. Ash, Mining and Metallurgy, March, 1941.

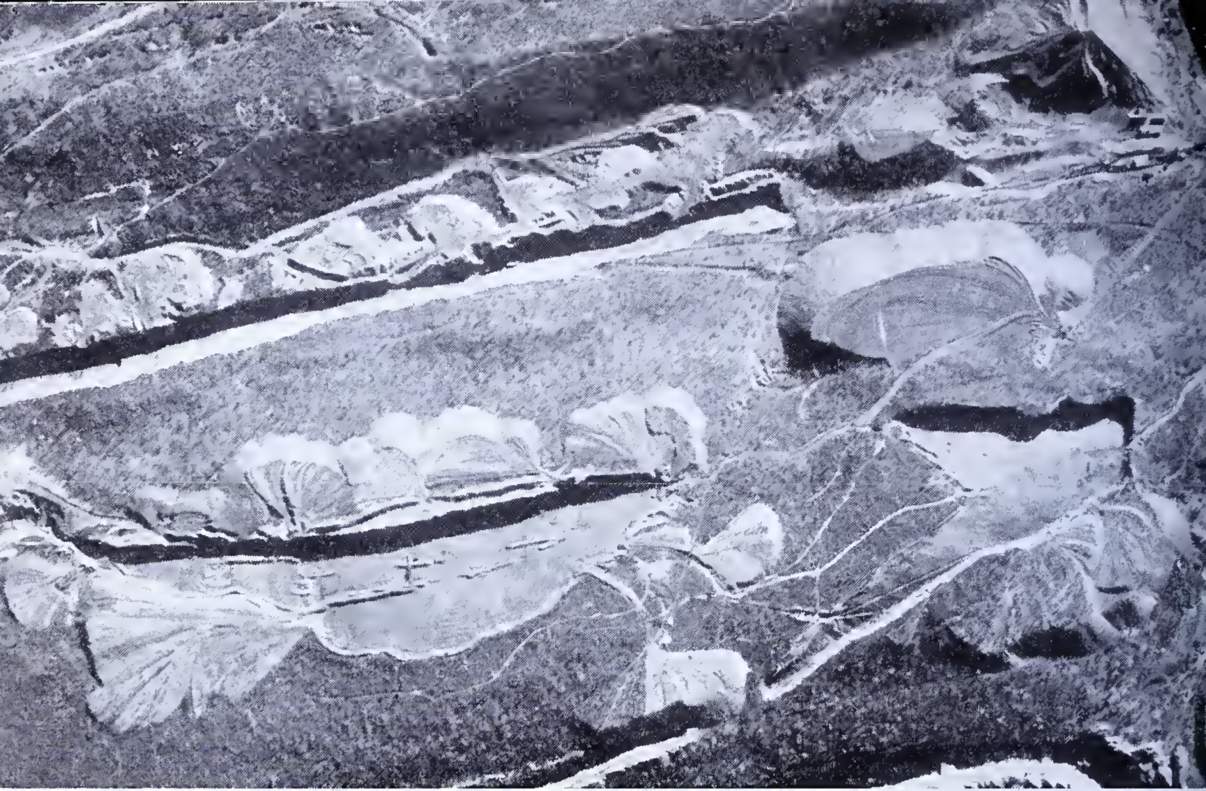
This Pennsylvania stream is unspoiled.



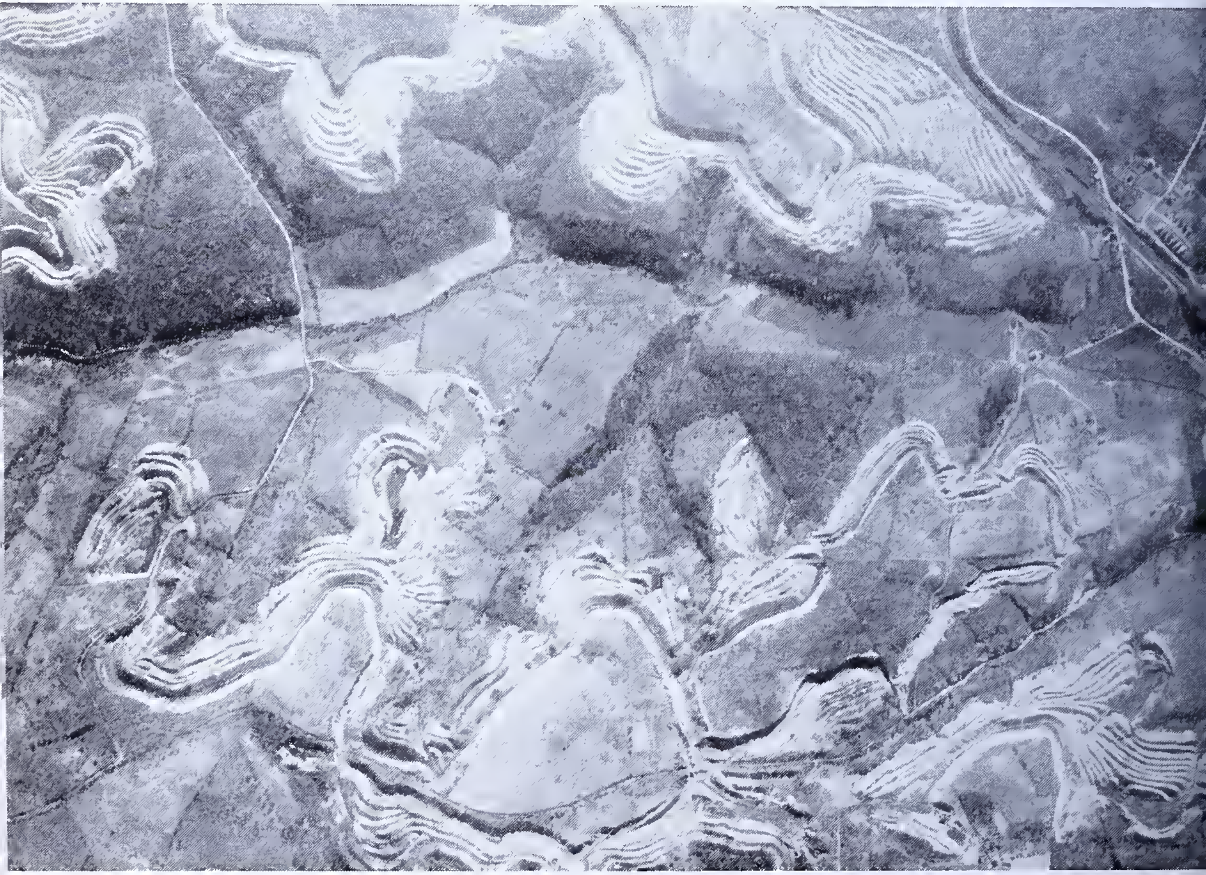
The channel of this one is clogged with the waste of the coal mines

Millions of tons of silt must now be dredged

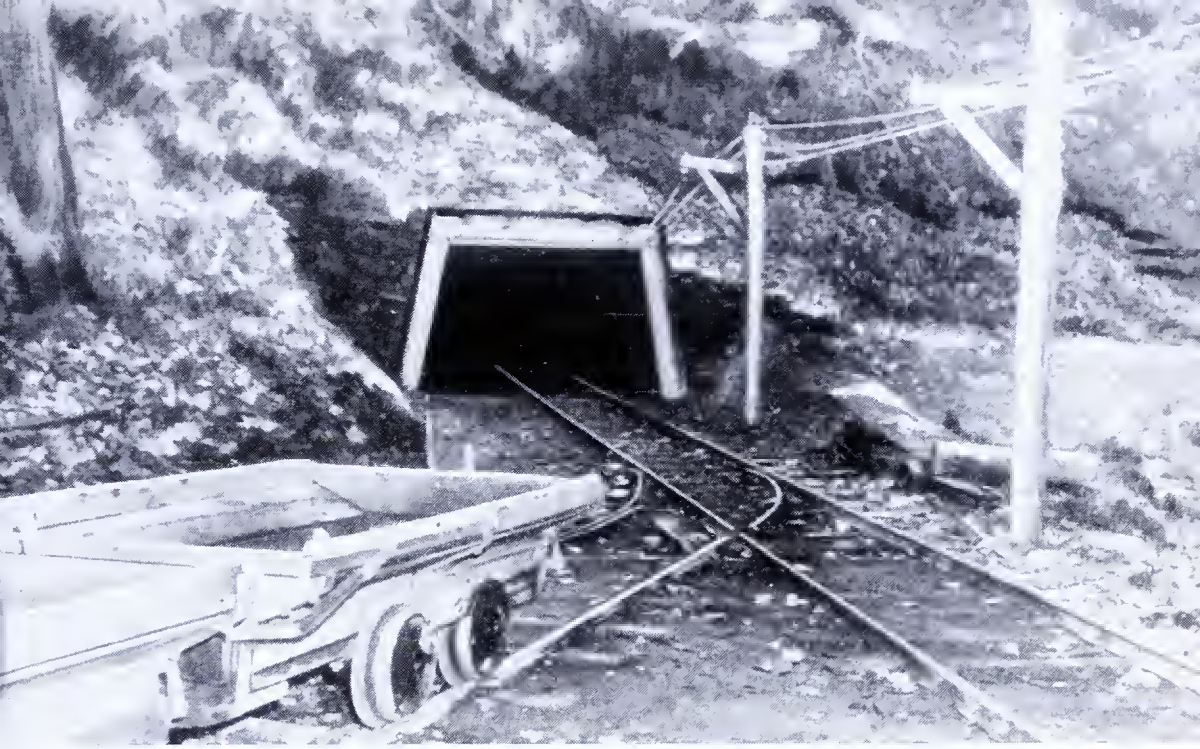
from the Susquehanna and Schuylkill Rivers.



These are coal strippings photographed from 15,000 feet.



To restore such land to usefulness is an important conservation problem.



Yet Pennsylvania's mines, quarries and clay pits

contribute enormous wealth to our Nation.

can ever be completely checked since much of the water finds its way into the shafts from the beds of streams and rivers, from long abandoned workings, or from flood water during spring freshets, the problem of reducing this cost factor is one that greatly concerns the economy of our State. Stream beds have been sealed, sink holes have been filled and drainage tunnels cut in the effort to diminish the high proportion of ground water which must finally be pumped from the anthracite workings. The problem is one justifying extensive study, since much of the future availability of our coal reserves may depend upon its solution here in Pennsylvania. In many other types of mineral production mine water appears to be one of the limiting factors in the future utilization of great treasures of coal and metals which undoubtedly lie deep below the surface of the earth.

The first principle of mineral conservation, therefore, is the prevention of any further needless waste of resources, whether they be resources of fertility in the soil, of fuel in the ground, or of metals or other minerals.

As a corollary to this action must also come the effort to recover, so far as possible, all of the rich material squandered by the hasty and heedless practices of the past.

Conservation In the Coke Ovens

As anthracite is one typical example of waste in the extraction of a primary raw material, so modern coke production may be taken as perhaps the best illustration of the type of conservation which develops in a highly competitive industry when the resources of technology are employed in the struggle to reduce costs of production. In the original or beehive type of coke oven, bituminous coal is roasted at a temperature which expels most of its oils and gases. The resulting porous coke is essential in the production of pig iron and steel and provides a practically smokeless fuel for domestic use, or for industrial furnaces. Carried out close to the coal mines, this method of coke production was once universal.

It was a carry-over into the mineral fuel industry of the methods of the charcoal burner who supplied the carbon for the smelting of all early iron. Even as late as 1893, 99.9 percent of all the coke produced in the United States came from beehive ovens, but it was already known or suspected that the thick, oily smoke rising from batteries of beehive ovens contained valuable ingredients which were going to waste. Steps were taken by a few enterprising coke producers to recover these by-products. As a consequence, several types of by-product coke ovens were devised and put into operation. By 1905, 10 percent of the American output was by-product coke. By 1915, the percentage had risen to 33.8; by 1925, to 78 percent; and by 1935, to 97.4 percent. The tremendous demands of modern war have brought many disused beehive ovens into active operation again. As a consequence the percentage of by-product coke dropped to 88.3 in 1942, but has risen again with the passing of the war emergency to approximately 92 percent, where it has held through 1947. Due to the still heavy demand for coke in the iron furnaces and steel mills, the production of the old type, or beehive, coke still continues higher than it had been for many years preceding the Second World War.

It has been calculated that if all the coke produced in 1945 had been the product of beehive ovens the wasted by-products would have been worth $223,000,000 and have a heating value equivalent to 16,835,000 tons of coal.

The Nation's by-product coke ovens operating in 1945 yielded 696,000,000 gallons of tar, from which can be derived creosote oil, tar-acid oils, and hard and soft tar. These ovens also produced 1,529,000,000 pounds of ammonium sulphate, 55,000,000 pounds of ammonia liquor—both important sources of farm fertilizer; 94,000,000,000 cubic feet of gas for domestic or industrial heating; and 246,000,000 gallons of crude light oil used as a source for the important chemical materials benzol, toluol, xylol, naphtha, and napthalene. The public encounters the last two products in the form of cleaning fluids and moth balls, but is equally indebted to the solvents, drugs, plastics, and chemicals derived from the other components.

What By-Product Coke Means to Pennsylvania's Wealth

How great is the stake of the Commonwealth in these savings of raw material is readily shown by the fact that Pennsylvania in 1945 produced 226,000,000,000 cubic feet of coke oven gas, more than twice that of any other state. It produced 200,000,000 gallons of tar, more than three times as much as its nearest rival. Its output of coke oven ammonia was 469,000,000 pounds, one-fourth of the National total. Of light oil and its derivatives, Pennsylvania produced 66,000,000 gallons, and, in addition, nearly 88,000,000 pounds of crude naphthalene and millions of pounds of other chemicals basic to the plastic industry and to the manufacture of important coal tar drugs. Our State leads in all these products so that this great total of prevented waste adds many million dollars to the income of our people. What is even more important, it represents a recovery for human use of materials of extreme importance from the smoke and vapors which would otherwise have merely polluted the air and discouraged vegetable growth in the neighborhood of the beehive ovens.

The contrast between the by-product and the beehive coke oven is typical of the line of progress which competitive industrial conditions impose in the processing of raw materials. The fact remains, however, that Pennsylvania produced in the last year of the war nearly 88 percent of all the beehive coke in the United States and that the industry is of overwhelming importance to at least two counties in the southwest of our State. In an emergency such as that occasioned by the outbreak of the two World Wars, the beehive ovens have provided an additional capacity to supply industry's heavy and sudden demands for metallurgical coke.

In the universal wastefulness of war this item of waste matters very little, but in years of peace and normal development the increasing demand for coal tar by-products compels the adoption of production methods which waste practically nothing of the humanly usable value in every ton of coal.

Savings Through Increased Efficiency

The improvements in the fuel efficiency of electrical generating plants illustrates a similar progress toward full utilization of our natural resources. In 1919 it required 3.2 pounds of coal to produce each kilowatt hour of electrical energy. By 1945 the requirement was only 1.3 pounds per kilowatt hour, an improvement of 59.4 percent in fuel efficiency. On the steam railroads the pounds required per thousand gross ton miles of freight carried in 1919-1920 were 170. By 1944 this figure had been reduced 32.9 percent to 114 pounds. It rose a little in the final year of war (1945) to 116 pounds due to the less efficient operations made necessary by the speed and volume of our war traffic. Again in 1918 and 1919 the average railroad passenger car needed 18.5 pounds of coal to carry it one mile. The amount had been reduced to 14.8 pounds by 1944, an improvement of 20 percent. In the iron and steel industry the number of pounds of coking coal per net ton of pig iron has been reduced from 3,194 to 2,629, a 17.7 percent saving in actual coke needed per ton. An additional saving in heat values of 19.7 percent has occurred in the past thirty years through the recovery in by-product coke ovens of combustible material formerly lost.

Despite the genuine and, in some cases, remarkable progress made in the utilization of fuel as a source of heat and power, in generating plants, and in certain types of steam installation much standard equipment still releases heat energy with losses that are little less than appalling. The steam locomotive of the old, but still commoner type, turns only from five to eight percent of the fuel energy of the coal burned under its boilers into power to move a train of cars. The latest type of steam locomotive has an efficiency of approximately twenty-five percent, an increase of from three to five times in the utilization of fuel energy, as compared to older types. Waste in domestic heating equipment is another serious cause of loss. There are few home heating systems so well designed that more potential heat does not go up the chimney or into the ash can than is delivered to the air inside the house. **The rising cost of fuel of all kinds demands greater efficiency in every use to which our precious reserves of coal, petroleum, and natural gas are put by either domestic or industrial consumers.**

Will Water Power Ever Replace Fuel Energy?

In every discussion of need for the conservation of the energy resources of our State and Nation one is immediately led to the consideration of what part other natural agencies for the generation of heat and power will play in the American future.

Most practicable and immediate, and the oldest of all methods of power generation, is the enormous energy available from the flow of our streams and rivers. It is more reliable and steadier than the motive power which can be derived from the winds and it is more simply available than the energies obtainable directly from solar heat. Water power now provides in a typical year approximately 7½ billion kilowatt-hours of electricity in the United States.

What are the prospects that water power may some day become our principal source of electrical energy and make unnecessary further drains on our supply of oil and coal? Recent estimates made by the Federal Power Commission, as of January, 1947, arrive at a total of 393,947,400,000 kilowatt-hours per year of potential electrical energy that could be generated in the United States by the use of water power alone. This vast total of undeveloped hydroelectric power is one and a half times the total power generated by all our electric utilities with the use of coal, oil, and water power combined in the boom year, 1946. In Pennsylvania, according to the estimates of the Federal Power Commission, the potential average annual generation of electricity by water power is 8,675,600,000 kilowatt-hours. This would be approximately one-half the State's average production of electrical energy from all sources during the war years from 1942 to 1945.

Such developments, however, could not be attained except at a high cost and at great sacrifices. The necessary materials, equipment, and labor for the construction of hydroelectric power plants of such great capacity would involve an enormous first cost. At the present prices of coal and oil, such installations are profitable along our Eastern rivers only at exceptionally favorable locations, and in regions where steam-driven generators are able to supplement hydroelectric power production in seasons and in years of low flow.

The construction of a power dam inevitably involves the flooding back of a large section of the upstream river basin. In certain areas of the South and West where population density is low and industrial development has been retarded, it has been practicable to absorb the cost of relocating residents and industries, and afterwards flooding the sites of their homes or factories, but only where the flow of water and lack of other available power justified this expense and social dislocation.

In our Eastern states such projects would be attended by far greater difficulty. Industry has developed largely along the banks of our rivers. Towns and cities, with dwellings housing hundreds of thousands of people, and also much of our most productive farm land, are located in areas along our streams which would become the beds of lakes formed by dams necessary to develop a hydroelectric capacity equal to approximately one half that now derived in Pennsylvania from the burning of coal. Only in circumstances of extreme necessity would the people of Pennsylvania, or of other of our Eastern states, consent to such a costly sacrifice.

The development of a full hydroelectric capacity, such as that indicated by the survey of the Federal Power Commission, is, therefore, likely only in the distant future when the scarcity of readily available coal has forced us to make use of all our National resources of electrical energy.

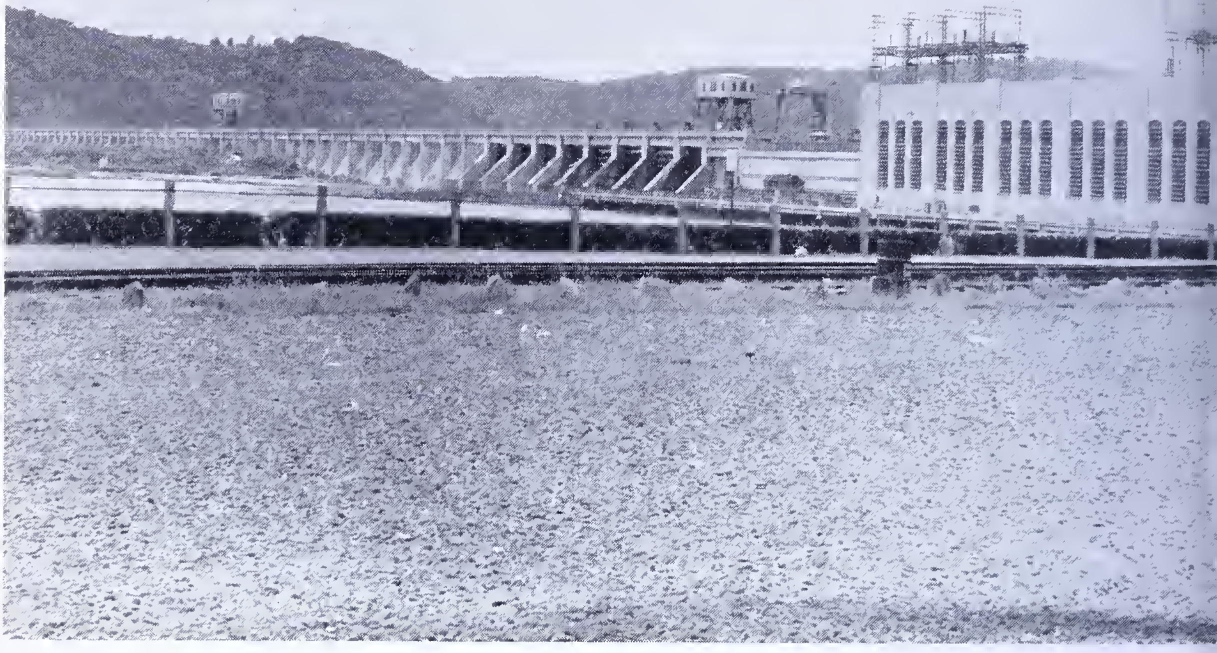
This is perhaps fortunate for the economy of Pennsylvania, since the welfare of the 195 thousand coal miners of our State is a matter of concern to us all. In view of the construction costs, the losses of agricultural land, and the wide-spread flooding of residence and industrial areas along our rivers which would be necessary if the hydroelectric resources of the State are to be largely increased, it does not appear that the steam power plant is in danger of being supplanted in Pennsylvania during the lifetime of this present generation. Over a very long term, however, it seems highly probable that even if attempts at employing the energy resources in the atom are not economically feasible for the production of power, the tremendous potential energy provided by the sun through Pennsylvania's 42 inches of annual rainfall may eventually enable us to use to better purpose than ever before the rich chemical possibilities of our oil wells and coal mines.

In the words of Joseph J. Walsh, Deputy Secretary of the Department of Mines of the Commonwealth of Pennsylvania:

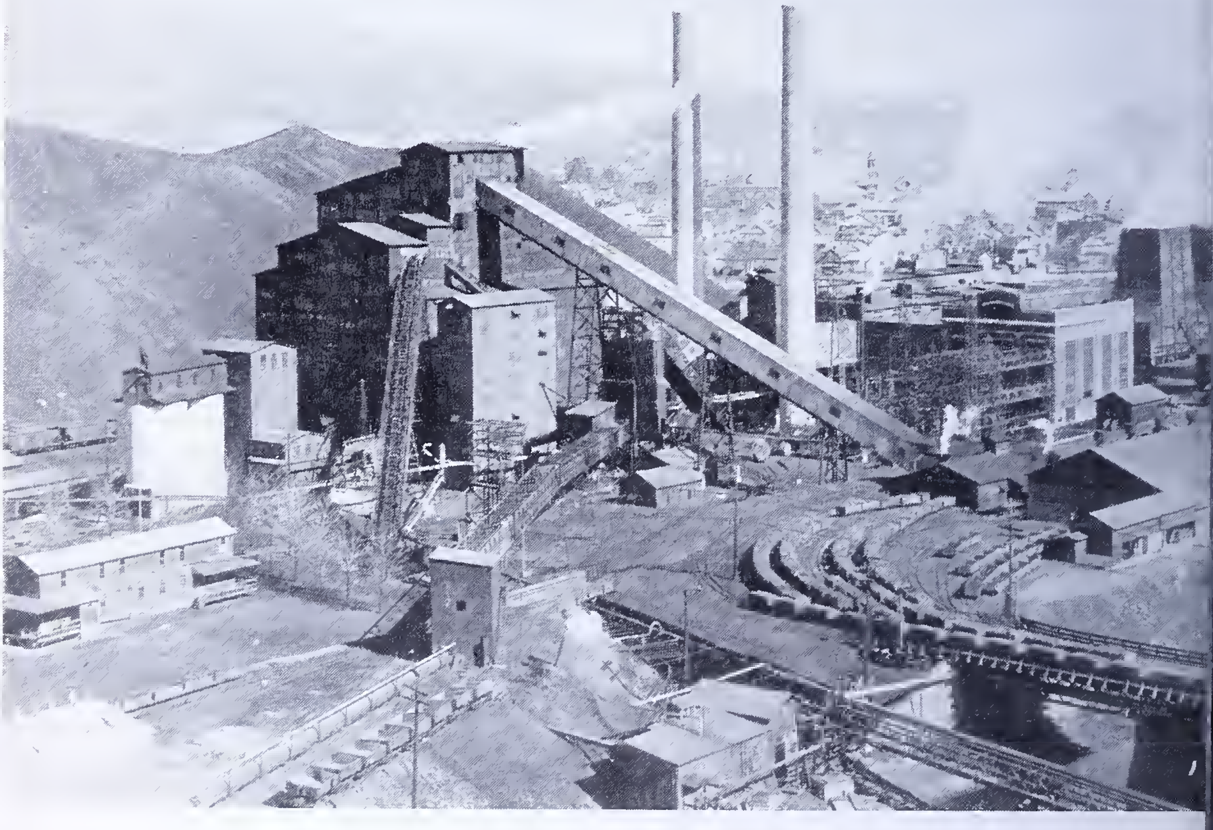
"Geologists have estimated that five to eight feet of compact vegetable matter were required, when subject to the compression of overlying strata, to form one foot of coal. A coal bed 50 feet thick, such as the Mammoth bed in the Schuylkill region of Pennsylvania, required a deposit of compact vegetable matter almost 400 feet in depth.

"Water power, unlike the other sources of energy, is not reduced by use, but is wasted if not used. The power of falling water in the Nation's streams may be utilized as long as nature continues to function as it does at present. Coal, oil and gas, on the other hand, must be considered irreplaceable National assets.

"The use of water power in the United States is as old as the industrial history of the country. In the early days the energy produced by falling water was available only at the power site. Today, with modern transmission equipment, a large hydroelectric plant conceivably might supply electric energy anywhere within a radius of more than 400 miles centered at the fall, an area nearly twice as large as the com-

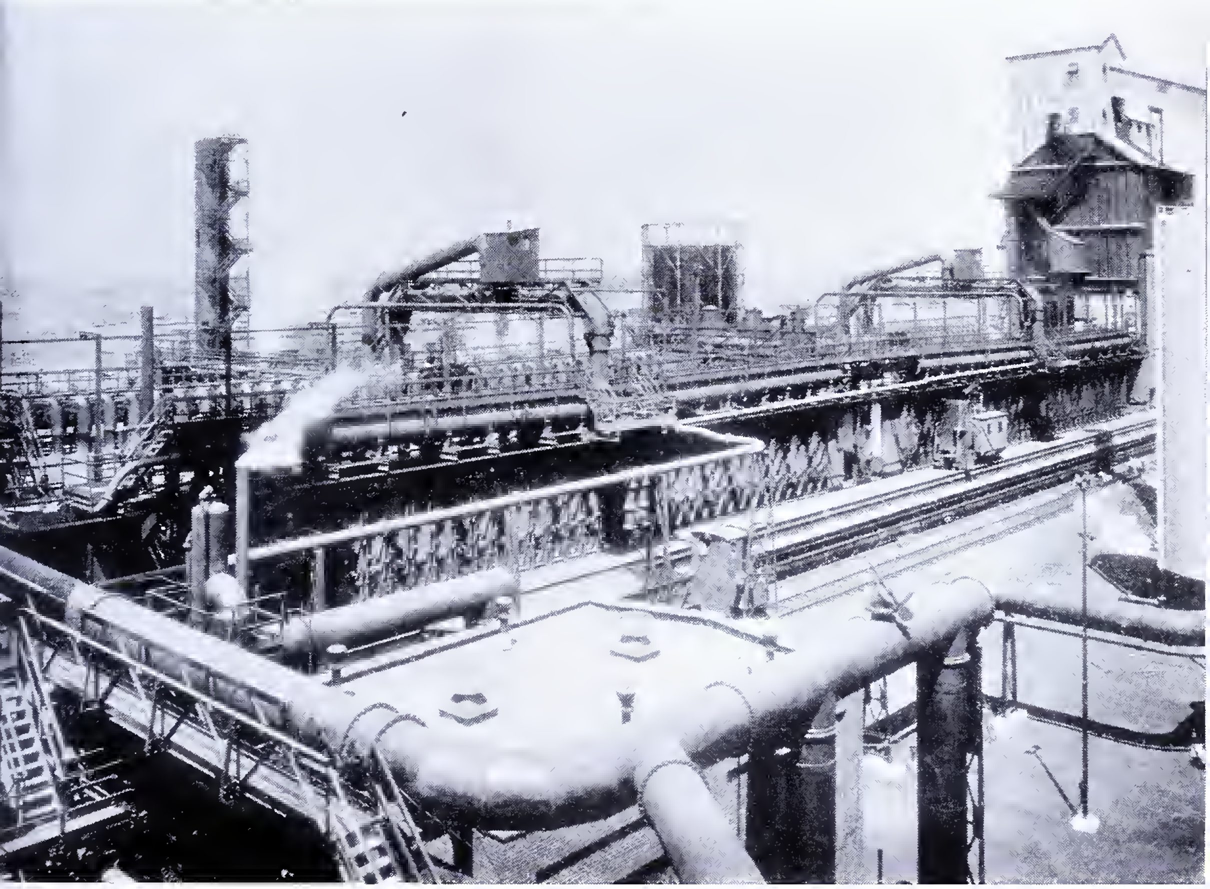


Our hydroelectric plants and our modern, efficient coal breakers



are both conserving precious natural resources.

The dark cloud over this bank of beehive ovens contains precious fuel and chemicals



which are recovered in this efficient by-product coke plant.

Coal is being recovered from Pennsylvania river beds.

This explosion of T.N.T. may give a clue to deposits of oil far below the surface.

The process of water-flooding begun in the Bradford field in 1921

has added millions of barrels to Pennsylvania's petroleum output.

bined land area of the states of New York, Pennsylvania, and New Jersey. Water power, in sharp contrast with mineral fuels, is an energy resource that renews itself. It has been estimated that all our water power, including both that already developed and that feasible of development, could produce annually energy equivalent to about one-fourth of the energy contained in all mineral fuels presently being consumed."

For Peace or War

Public utilities, steel mills, and coke plants are types of enterprise whose annual production is valued at hundreds of millions of dollars. Competition is keen and resources are available to command technical skill of a very high order in reducing waste and securing economy of operation. As a consequence, great savings have been made possible. There are, however, hundreds of other industrial processes whose waste products now contaminate our air and water where the possibilities of the recovery of valuable by-products have not been properly explored. Here lies a vast field for chemical and physical research. There is no reason to doubt that of the millions of tons of waste products now annually poured into the rivers of our State, causing grave problems to other industries and to municipalities downstream, a high percentage represents useful and even necessary material—minerals that are being lost forever to human use—organic chemicals which would enrich our soil and provide the raw materials for a new industrial cycle. From the tall stacks of hundreds of Pennsylvania's seventeen thousand industries smoke and gases are now escaping which may hold the secret of some important drug to relieve human suffering, or provide some significant contribution to the amenities of life. It is obvious that research of the type which has given us our by-product coke ovens, our nylons, our sulpha drugs, and our dozens of new types of plastics is today the most important investment which the people of Pennsylvania and the people of the United States can make in the security of their future.

So far we have been considering the conservation needs of Pennsylvania on the assumption that, following two destructive wars within one generation, we now face a long period of peace in which wasteful practices of the past can be corrected by a more rational approach to human problems. Unfortunately, in the present state of world affairs, it is not possible to rely on this assumption. For our own self-protection we must also face the possibility of a third world war. If such a war should occur, it is likely that its drain upon our natural resources may very greatly shorten the life of our present civilization.

The tremendous demands of war on the minerals and fuel of a nation must be satisfied at a frantic speed which is a second cause of waste, highly destructive to the reserves on which our future must be maintained. It is, for instance, generally conceded that the probable national oil reserves are approximately equal to twice the known and proved reserves of 1948. This implies a sufficient supply to last for about thirty years. The more rapidly this pool of power is drained, the shorter will be its eventual life, and while thirty years is an adequate time to provide all necessary facilities for substitute fuel, it is likely that the rate of production will taper off long before that period has been reached and that our thirty-year supply will require perhaps a century for its full extraction.

Meanwhile, we are constantly increasing the number of Diesel-driven trucks, steamships, and locomotives. We are installing millions of oil-burning domestic furnaces. Not only the ships of our Navy, but of most of the Merchant Marine are powered by oil-burning motors or by oil-fed boilers. The synthetic rubber and plastic industries are increasing their demands on the petroleum supply, and we are forced by the exigencies of modern competitive design to construct jet-propelled planes whose fuel consumption greatly exceeds that of planes powered by internal combustion motors.

The world is indulging in an orgy in the use of its raw materials which it is barely within the capacity of our present known resources to supply at a reasonable cost. One more war to step up those demands and to compel over-production and the United States will be dependent on foreign resources for many of its basic needs until such time as the production of adequate substitute materials will have risen to the level of national demands. But, exhausting wars diminish the recuperative power of a civilization much as exhausting diseases lengthen the period of recovery for a man. They often diminish the capacity for readjustment and irritate the nervous systems of great nations so that positive constructive action is no longer possible. This face we see illustrated in the Europe of 1948 as contrasted with Europe of 1921 after the close of the First World War.

The true danger facing the United States is, therefore, not that its oil will give out, because we can replace the oil with synthetic liquid fuel if war does not exhaust our energies and confuse the thinking and organization of our people as it has done to so many of our recent allies. We do not need to fear even the exhaustion of our formerly great wealth of high-grade iron ore, for granted normal thinking and normal conditions of life in America our practically unlimited stores of low-grade ore could be made to serve. But, we do need to face the fact that a country which is consuming its natural resources, both in times of peace and war, at a rate much faster than that of any other nation in the world, cannot count surely on being allowed the leisure to make all these readjustments. Far too many of the important strategic materials necessary for national defense are not present within our national borders in adequate quantities to insure our future if we use them heedlessly today, with no thought of any obligation to our future.

CONSERVATION AS A PERSONAL OBLIGATION

The years of unbounded plenty in the raw materials of our civilization are over. This fact should hold no ultimate terrors for those who believe in the universal adaptability of men and in the powers of technical invention. Yet, many years are frequently required to perfect any important change from one source of material or of energy to another, and such years could be highly critical to the fate of a state or of a people.

For every man there is thus also a personal conservation problem. To eliminate waste in our use of the irreplaceable minerals and fuels is to act intelligently in the interest of our own safety and of the security of our children. Almost every day of our lives we face choices between more or less wasteful uses of these precious gifts of nature.

There are very few today who would subscribe to the doctrine that the only possible solution of America's economic problems is for people to use and discard manufactured things as rapidly as possible, so that constant replacement of the old by the new might provide work for all the employes of industry and maintain our economic machine at a high rate of operation. Yet, even so late as 1940 the doctrine of creative waste as the only solution for the enormous productive power of modern machinery was preached by many economists.

Seven years have taught us that this kind of heedlessness in our attitude toward natural resources could only be a path toward eventual self-destruction. We are much more aware today than ever before in our National history of the need for the provision of vast reserves of fuels, metals, and other raw materials on which we might call with confidence in a period of National emergency. So, economy on the personal level—the heating of one's home only to a point of healthfulness and comfort, which is far below the maximum possible by modern equipment—the saving of gasoline and tires, and also of human lives by careful driving at moderate rates of speed, have become tests of good citizenship.

Fortunately a personal conservation program coincides with personal economy and immediate self-interest. The immense waste of fuel in household heaters costs domestic consumers hundreds of millions of dollars every year. A considerable portion of this loss would be prevented by the insulation of dwelling houses against heat loss. Since proper insulation is a permanent addition to the value of a property, its first cost can be underwritten over a period of many years. The substantial savings of fuel consumption in the wintertime and the protection afforded against excessive roof heat during the summer months make this form of conservation a matter of first priority to the individual citizen. The installation of storm windows and doors and of weather-stripping also results in very marked fuel savings. Reductions in fuel bills of 10 percent through the use of weather stripping, of 31 percent through the installation of storm sashes, and of 66 percent through insulation of walls, ceilings, and windows have been reported.[9]

The efficiency of domestic heaters is generally comparatively low. Large heat losses occur in the average home furnace through the imperfect burning of fuel, particularly in the spring and autumn months, though some types of equipment burn coal very inefficiently at any period of the year. A second serious loss of the heat energy in the coal occurs from the fact that the hot air drum, the steam boiler, or the water heater connected with a domestic furnace usually absorbs only a fraction of the heat released by the burning of the coal. In many types of equipment a major portion of the heat escapes up the chimney instead of being delivered to the air of the dwelling. As a consequence of these two types of loss, and the additional losses occurring whenever a new fire must be built, it is probable that the average hand-fired heating device is only 40 to 60 percent efficient.

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[9] Transactions of the Third Annual Anthracite Conference, page 19.

For many years the anthracite industry has been at work in the development of improvements in domestic furnaces. The Anthracite Institute has devised simple fuel-saving damper controls which can be installed in any type of coal-burning equipment. New types of furnace doors and an improved technique for the banking of fires have solved one of the most serious problems in the use of hand-fired anthracite—that of maintaining a low heat during periods of the year when the maintenance of an active fire results in the overheating of a dwelling. Information as to these devices and instruction in the proper use of domestic heating equipment should be available from any progressive coal dealer.

In the use of oil-fired heating equipment a careful observance of the accepted rules for the reduction of house temperature during night hours would result in a saving of millions of barrels of distillate oil every winter.

Further research leading toward the improvement of all types of domestic fuel burning equipment is being pressed by the various fuel industries and by the research agencies of our universities and foundations.

Meanwhile, the most efficient and economical use of one's present equipment is an important contribution every citizen can make to the cause of conservation.

This implies an attitude toward the things we buy and use which regards them with respect as the outcome of forces larger than man and as representing materials which should be employed for their maximum good, but not wastefully, any more than we would use wastefully any other resources which we would desire our children also to be able to share. This type of economy has been forced on the people of other nations long ago and often by oppressive systems of government. That we still have a chance to adopt it voluntarily is a tribute to the richness of our own inheritance.

Many tendencies of present day industrial and domestic life run counter to sound conservation principles. In nations somewhat older than ours in their industrial history, necessity has forced changes in the use of metals and metal products which American industry would adopt with great reluctance. British motor cars, with the exception of a few luxury models, require only half the steel used in the average American car and, consequently, operate with half the fuel and oil consumption necessary for our more impressive and massive type of automobile.

The average American home consumes in the course of a year a very considerable weight of steel in the form of cans and other containers, much of which is dumped into the ash pile and never returned to the steel furnaces in the form of scrap. The annual loss by the rusting of unpainted iron is also a considerable item.

These and many other similar types of waste are, by and large, social inheritances of the period of seemingly inexhaustible mineral wealth from which we are slowly and painfully emerging.

The day is, however, fast approaching when, unless we can cultivate habits of moderation in the use of our irreplaceable minerals, the restrictions necessary for the National safety will be unusually burdensome to a people so used to self-determination, independence, and plenty as we have become during the past three hundred years.

A PROGRAM OF RESEARCH AND DISCOVERY

To meet these conditions a program of action involving our Nation, our State, and our industries, as well as our own personal demands, is an obvious necessity. Enlightened self-interest compels us to consider as matters of the highest priority the conservation of our replaceable resources, such as our timberlands, of our irreplaceable resources represented by the Nation's mineral wealth, and also of such resources as the topsoil whose losses could in part be replaced, but only after efforts extending over a period of many years.

The chief weapon available for us in this cold war against our own self-weakening practices is a program of scientific research pushed with all the energies we have so recently displayed in our invention of new means of destruction. Supplementing such research by industry, by government, by our educational institutions, and by every available technical laboratory in our State and Nation, and by the field forces of our National and State Geological Surveys must also be developed a national policy designed to increase our strategic stock piles of all essential materials, and to discourage the exportation from our shores of every type of mineral product likely to be in short supply for our own use during the lifetime of the present generation.

This is an imperative program if the United States is to maintain a strength commensurate with the weight of its present responsibilities, and if it is to provide a livelihood for its growing population and maintan their present standard of living.

For the Commonwealth of Pennsylvania so much of such a program as can be activated through State government and through the State's industries will be the price we are compelled to pay for continued growth and prosperity. While the people of our State cannot, of course, of themselves determine National policy, their industries and their government are equipped, or should be equipped, to push forward in every direction of research which can provide assurance that our position as the greatest mineral-producing section of our Nation will be maintained over the foreseeable future. Some of the objectives of such a program have already been indicated:

a. **To discourage waste in the extraction, processing and use of our mineral resources.**

b. **To recover whatever is recoverable of materials wastefully used in the past.**

c. **To discover every possible value in mineral resources not now being profitably used.**

d. **To encourage the development of all practicable hydroelectric power and thereby to diminish the drain on the irreplaceable fuels—coal, petroleum, and natural gas.**

e. **To discover, with every available device of modern science, whatever buried mineral treasure still lies unknown beneath the surface of our State.** This last is not strictly a conservation measure, but it is an effort inseparable from the attempt to direct all our known resources to their most effective use.

Recent years have seen the development of many new geophysical devices for the exploration of the depths of the earth, but adequate means have never been available for applying such methods of discovery to the general problem of Pennsylvania's hidden resources. It remains true today, as it has been in the past, that most of the great mineral resources of Pennsylvania have become available to us through accidental or casual discovery, and that we still have a very inadequate knowledge of the mineral wealth underlying our soil. The chances are not unfavorable that such a search would prove richly rewarding.

Besides its anthracite, its bituminous coal, and its uniquely valuable petroleum our State contains what was perhaps the largest American deposit of magnetite iron ore, was once the World's chief source of both nickel and chromium, is today one of the two leading American producers of the metal cobalt, and also could supply small quantities of copper, lead, zinc, manganese, chromium, gold, silver, graphite, and many other important minerals, though not now in quantities or concentrations sufficient to justify commercial exploitation. The State's deposits of low-grade iron ore may soon become of great commercial value, but more exact knowledge as to their extent awaits the study of all probable areas by such devices as the newly developed air-borne magnetometer. Since only a small part of the State has been mapped in a modern geologic sense —further geological studies of the rocks and their mineral potentialities are of the utmost importance.

Two agencies of the State government—the School of Mineral Industries of The Pennsylvania State College, and the State Geological Survey of the Department of Internal Affairs—should now be given the equipment and personnel to carry out this important task in cooperation with certain of our great research agencies supported by private endowment, or operated by important industries. Many of Pennsylvania's institutions of higher learning have available some part of the technical facilities needed for other phases of the great task of mineral research. The American Petroleum Institute and, locally, the Bradford Producers Association, in cooperation with the Pennsylvania Grade Crude Oil Association, the laboratories of many of our great oil and coke companies, and of the Anthracite Institute are all engaged in highly productive efforts to face specific problems. Important discoveries and valuable devices have resulted from these investigations, but very much more needs to be done than has ever been possible through these uncoordinated efforts.

It appears to us that Pennsylvania has not adequately recognized the necessity, in an age so dependent upon technical progress, of promoting the peculiar interests of the State in the development of its raw materials. The matter is so important and indeed so vital to our success that the establishment of a unified program of research into the extent and full use of our resources appears to be a responsibility which the State government should now accept. The people of the Commonwealth could make no wiser investment than the support of such an undertaking, for upon it largely depends their place in the future of America.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

*1—Preliminary Report. 682 pages, 152 charts, December, 1934.

*10—Drainage Basin Study. 3 vols., 611 pages, 1937.

11—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 1. (Townships of the Second Class, Counties, Regions.)

12—Planning and Zoning Powers and Procedures in Pennsylvania, 1938. Vol. 2. (Cities, Boroughs, First Class Townships.)

15—Recent Industrial Trends and New Employment Opportunities in Pennsylvania.

16—Retail Trade in Pennsylvania, 1946.

17—Industrial Utility of Water in Pennsylvania. Chemical Character of Surface Water, 1944 to 1946. 1947.

18—The Pennsylvania Zoning Primer (Revised), 1948.

19—Local Powers for Community Development, 1948.

20—A Pennsylvania Recreation Manual, 1948.

These publications may be seen in representative public libraries. A limited number of those listed are available for distribution until the present supply is exhausted. Those marked with an asterisk are now out of print but may be seen in representative public libraries.

The following issues of **Pennsylvania Planning** are still available.

Local Tax Rates, May-June, 1940.

Community Self-Appraisal (Revised Edition), April, 1942.

Comparative County Data, May, 1942.

Planning and Zoning Progress in Pennsylvania, July, 1942.

Population, October, 1942.

Handicrafts in Post-War Planning, May, 1943.

Plastics, July, 1943.

Air Photographs, February, 1944.

Light Metals and Stainless Steel, August, 1944.

Topographic Mapping Needs, February, 1945. (For limited technical distribution.)

Community Action for Local Self Development, July, 1945.

Conservation, August, 1945.

Forest Resources, November, 1946.

Soil Conservation, September, 1947.

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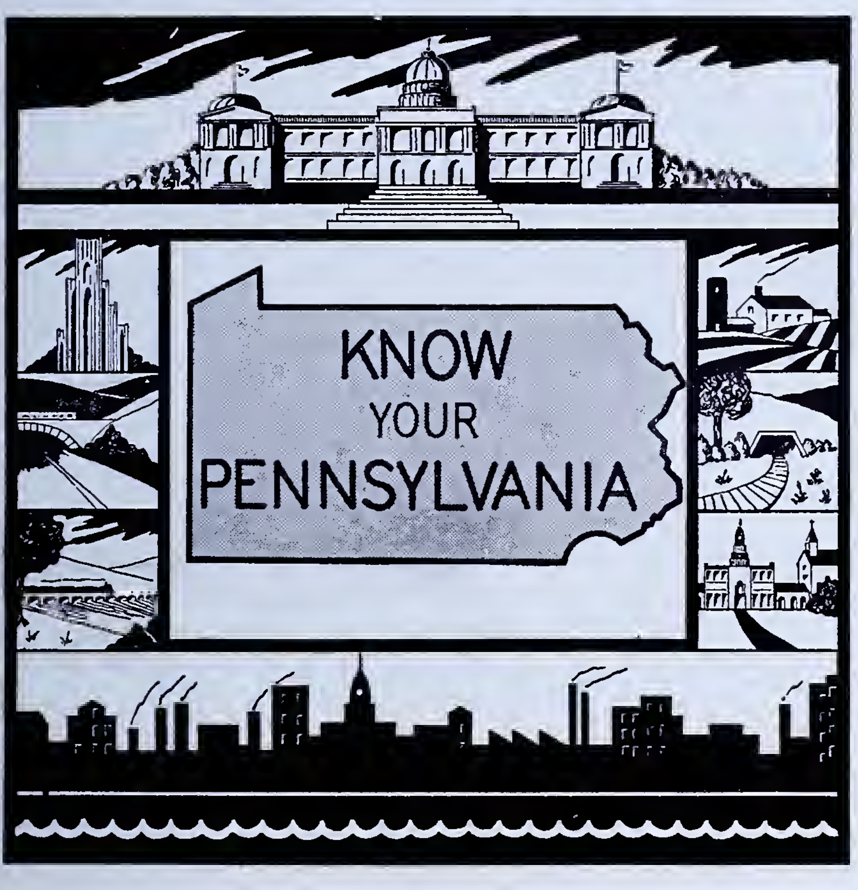

COMMONWEALTH OF PENNSYLVANIA

DEPARTMENT OF COMMERCE

STATE PLANNING BOARD

38.49

SEPTEMBER 1949

COMMONWEALTH OF PENNSYLVANIA

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Know Your Pennsylvania

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A Brief Survey of the Resources and Achievements of One American State

State Planning Board
Pennsylvania Department of Commerce
Harrisburg, 1949

Independence Hall
The Birthplace of American Freedom

Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
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Ressica Falls in the Poconos

Introduction

One of the most remarkable characteristics of the Keystone State is the variety of its natural features and its production.

The changing colors of its summer fields, as one flies over them or passes by them along the railroads and highways, make evident the diversified nature of the State's farms, its orchards and field crops. The year-round search for outdoor pleasure by the people of our Eastern states has made them keenly aware of the scenic beauties of Pennsylvania's countryside.

It is probable that in all the world no other area of 45,000 square miles equals Pennsylvania in the wealth of its resources and the range of its products. Where else can be found an industrial pattern so rich and varied as to lead a whole hemisphere in the production of steel and pig iron on one hand, and of delicate sheer silk and nylon hosiery on the other? What other region of the earth produces, at the same time, more coal and more lace curtains, more cement and more umbrellas, more zinc and more shirts, more glass, more coke, and more cigars—more of all these than any other state in the Nation, or any nation but our own in the Western World?

Hearing these facts about Pennsylvania a stranger might well imagine the whole area of this State to be nothing but a long line of factory chimneys. But one would also have to tell him that Pennsylvania contains more than 15,000,000 acres of forest and that more than 3,000,000 acres of that woodland are owned by the public and are devoted to wild life, flood control, and public recreation.

But if that is so, between your industries and your forests, the stranger would conclude, there can be nothing else. You must depend for your food supply on other places. But that would be far from true for in addition *to all its great and varied industries and its many million acres of wild land, Pennsylvania is one of America's great farming states. It produces more steel, but also grows more cigar leaf tobacco. It mines more coal, but also harvests more buckwheat. It ships and receives a greater tonnage of commodities than any State in the Union. It is among the Nation's greatest shipbuilders. It possesses one of our Country's busiest seaports and the World's oldest continuously productive oil field, and it also stands among the Nation's great producers of potatoes and apples.*

It is the only State with outlets within its own area to the Atlantic, the Great Lakes, and to the Mississippi and Gulf of Mexico. Its highways would reach four times around the Earth, and include the finest protected roadway on the Continent.

With all this teeming industry and modern transportation the State has also 9,500 miles of fishing streams, and every year from its woodlands, 850,000 hunters bring home small game by the millions, an average of 50,000 deer and from 200 to 600 bears.

In war or in peace Pennsylvania is a land of inexhaustible energy and variety, a vital factor in American progress and success.

The enterprise and ability of Pennsylvania men and women have had a profound effect on the history of the modern world. Both John Fitch and Robert Fulton, the inventors of the steam boat, were Pennsylvanians. The first commercial oil well in the world was drilled by Edwin L. Drake on Pennsylvania soil. The railroad air-brake was the invention of a Pennsylvanian, George Westinghouse. Robert E. Peary, the discoverer of the North Pole, was born at Cresson, near Altoona.

Pennsylvanians have been equally distinguished as statesmen and as leaders in all of our nation's wars. George Marshall, Chief of Staff in the Second World War and afterwards Secretary of State, Peyton C. March and Tasker H. Bliss, Chiefs of Staff in the First World War, were all Pennsylvanians.

KNOW YOUR PENNSYLVANIA

I

Topography, Climate, and Land Use

The ridges and the valleys of the Appalachian Mountain System, curving across Pennsylvania from northeast to southwest, divide the State into four fairly distinct topographic and climatic areas.

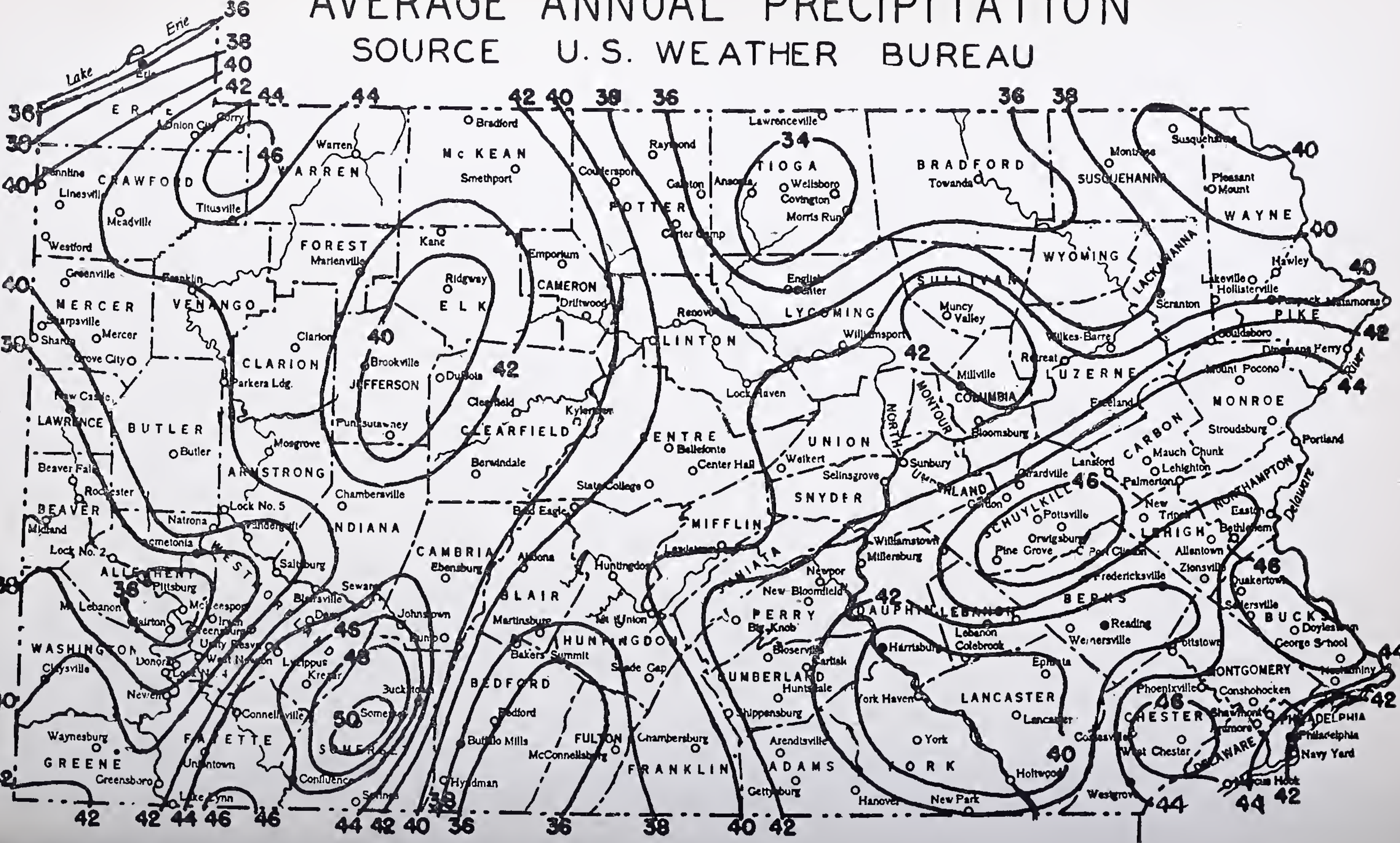
The eastern ridges, or Blue Ridge Mountains, once among the tallest mountain ranges in the World and almost the oldest, mark the western limit of the *coastal climatic belt* of usually moderate temperatures and ample rainfall.

Within this belt temperatures as high as 90 degrees occur on an average of only 15 days during a summer season. Temperatures of zero or lower at Philadelphia occur on an average of one winter in four, and at Harrisburg, of one winter in three. The growing season in this belt averages 170 to 200 days. The average seasonal snowfall is about 30 inches, and the rainfall ranges from 38 to 46 inches.

The *mountain belt,* which includes both the Blue Ridge and the Allegheny Systems, occupies the center of the State, an area consisting of ridges and valleys toward the southeast, and to the west of taller broken plateaus, which reach their highest point in Somerset County. This section has somewhat greater temperature extremes than the southeastern part of the State with an annual precipitation averaging three to four inches more, and a much more variable winter snowfall which ranges from 88 inches near Somerset to about 37 inches in Huntingdon, Mifflin, and

AVERAGE ANNUAL PRECIPITATION

SOURCE U. S. WEATHER BUREAU



ANNUAL AVERAGE = 42.13 INCHES — 1887 TO 1949

Juniata Counties, the ridge and valley area. The growing season is longest in the Susquehanna Valley where it averages 165 days, and shortest in Schuylkill and Carbon Counties and on the Pocono Plateau where it averages less than 130 days.

The *northern counties* have an average elevation greater than that of the valley region south of them, with considerably lower minimum temperatures in the winter. The daily average temperature ranges from 22 to 26 degrees in midwinter, and from 66 to 70 degrees in midsummer. The growing season is less than 130 days throughout most of the area, but in Erie County increases to about 175 days along the Lake shore. The seasonal snowfall averages about 54 inches, and fields are normally snow-covered three-quarters of the time during the winter. These northern counties are the most heavily forested area in the State.

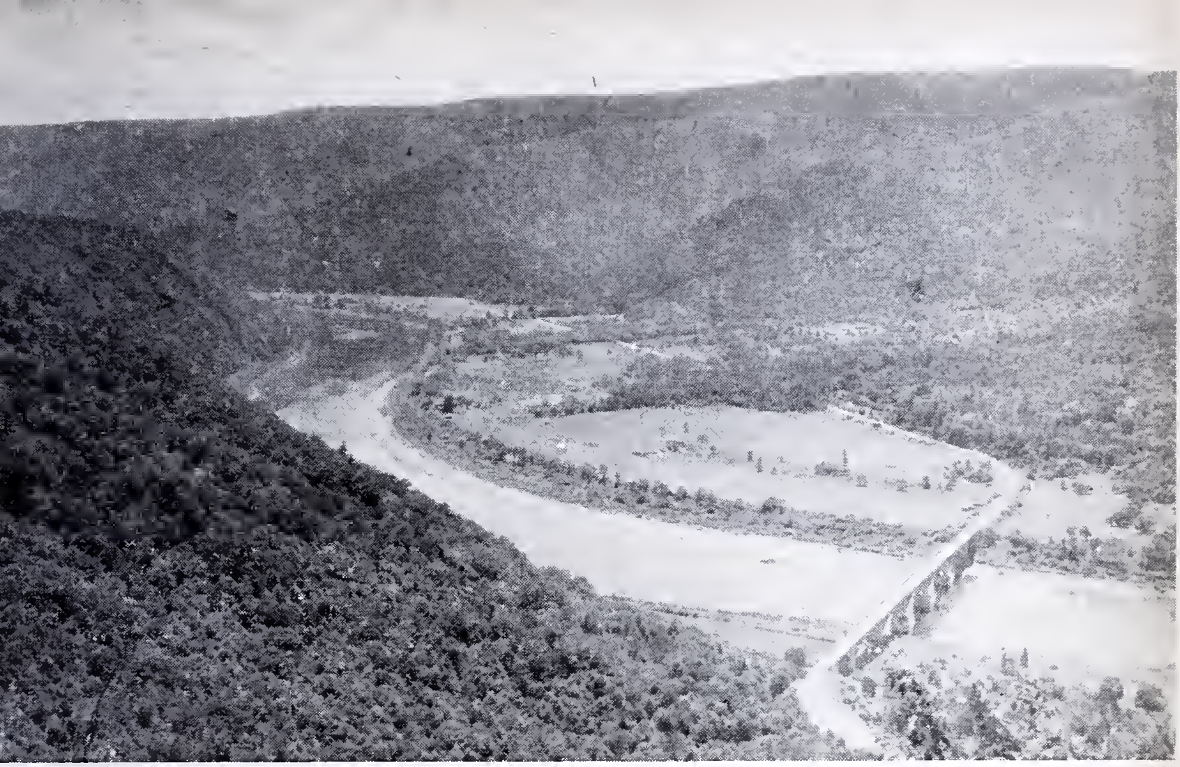
The *western* section of Pennsylvania within the Ohio basin has more changeable temperatures and more frequent rainfall or snowfall than other parts of the State. The growing season is variable, ranging between 140 and 175 days. While the rainfall approximates the State's average, it usually occurs in smaller amounts at more frequent intervals. The average snowfall is about 50 inches.

More than 52 percent of the State's area is in forest land. In Cameron County almost 93 percent is forested. Forest County has slightly over 90 percent. Pike, Elk, McKean, Clinton, Sullivan, and Potter Counties have over 80 percent. Thirty-four counties of the State have more than 50 percent of their area in forest land, and only seven counties have less than 20 percent.

More than one thousand square miles of lakes and rivers lie within or are under the control of the Commonwealth. This includes 735 square miles of Lake Erie, and 288 square miles of inland waters. While there are no very large inland lakes in the Commonwealth, a generous number of smaller ones are scattered over the northeastern and northwestern counties. Some of the best known are Pymatuning and Conneaut in the northwest, and Wallenpaupack, Harvey's Lake and Eagles Mere in the northeast.

Pennsylvania's average annual rainfall of 42 inches is both the source of our agricultural prosperity and the

On one of Pennsylvania's thousands of miles of
well stocked fishing streams



More than half of the State is forest land

cause at times of serious flood danger and of constant soil erosion. In the average year the total volume of Pennsylvania's rainfall weighs more than 138 billion tons. An average of more than 3 million tons falls annually on every square mile, or more than 4,700 tons on every acre. Most of this great volume of water flows out of Pennsylvania toward the sea through three great river systems—that of the Delaware and Schuylkill on the east, of the Susquehanna in the central valley, and of the Monongahela, the Allegheny, and the Ohio in the west. There are other smaller drainage systems flowing both to the north and to the south, so that Pennsylvania's rainfall has probably more diverse outlets to the sea than those of any other State.

It is discharged down the Ohio into the Mississippi and thence to the Gulf of Mexico, into Lake Erie, into Lake Ontario, and through those lakes into the Gulf of St. Lawrence, into the Delaware Bay, and into the Chesapeake Bay both through the Susquehanna and through the Potomac.

The large limestone deposits underlying Pennsylvania's soil have resulted in the formation of many caves through underground drainage and of the occurrence of a number of big springs which are the outlets of subterranean streams—the most interesting of which is Boiling Springs in Cumberland County, with a flow of 22½ million gallons a day. In the counties of Centre, Blair, Clinton, Franklin, Bucks, Lehigh, and Lancaster are thirty great springs, no one of which has a flow of less than one million gallons of clear water every day.

More than 3,148,000 acres, or approximately one-ninth of all Pennsylvania land is publicly owned. By far, the largest areas are held by the Department of Forests and Waters as forest and park land, and by the Pennsylvania Game Commission as game refuges and hunting areas. The total acreage under the custody of these two agencies is 2,633,447.

The Federal Government owns 474,678 acres within the Commonwealth including the Allegheny National Forest in Elk, Forest, McKean, and Warren Counties, and several rural resettlement areas and historic sites, of which the largest is the Battlefield of Gettysburg.

Many of the State's holdings are of historic sites, such as Valley Forge, Daniel Boone's birthplace in Berks County, and Pennsbury Manor, the re-created country home of William Penn, in Bucks County along the Delaware. Most of the State park and forest areas are in regions of great scenic beauty, such as Cook Forest with its virgin pines and hemlocks, and Rickett's Glen with its romantic chasms and its chain of waterfalls. Such areas are now being preserved in the ownership and for the pleasure of all our people.

Because of its many spots of great historic interest, as well as the variety of its scenic attractions, Pennsylvania ranks fourth among the states in recreational travel and as a vacation land. According to estimates made on the basis of federal and state data by the Automobile Manufacturers Association, only New York, Florida and California lead Pennsylvania in the volume of tourist expenditures in 1948.

Pennsylvania

Land Use

	Square Miles	*Percent*
Total Area	45,331.4	
Forest Land	23,636.9	52.1 of Total Area
Farm Woodland	5,175.1	21.9 of Forest Land
County and Municipal Forest Land	205.2	0.9 of Forest Land
Non-Forest Land	21,694.5	47.9 of Total Area
Farm Land	23,468.2	51.8 of Total Area
Arable Land	12,502.1	53.3 of Farm Land
Pasture Land	6,626.1	28.2 of Farm Land
Woodland	5,175.1	22.1 of Farm Land
Other Land	1,668.8	7.1 of Farm Land
Publicly Owned Land	4,918.9	10.8 of Total Area
Federal	741.7	
State	4,119.8	
County and Municipal	57.4	

Recreation Land	*Number*	*Acreage*
Parks	619	134,454
Playgrounds	454	577
State Forest Picnic Grounds	45	2,209
State Forest Monuments	13	2,425
State Forest Vistas	3	38

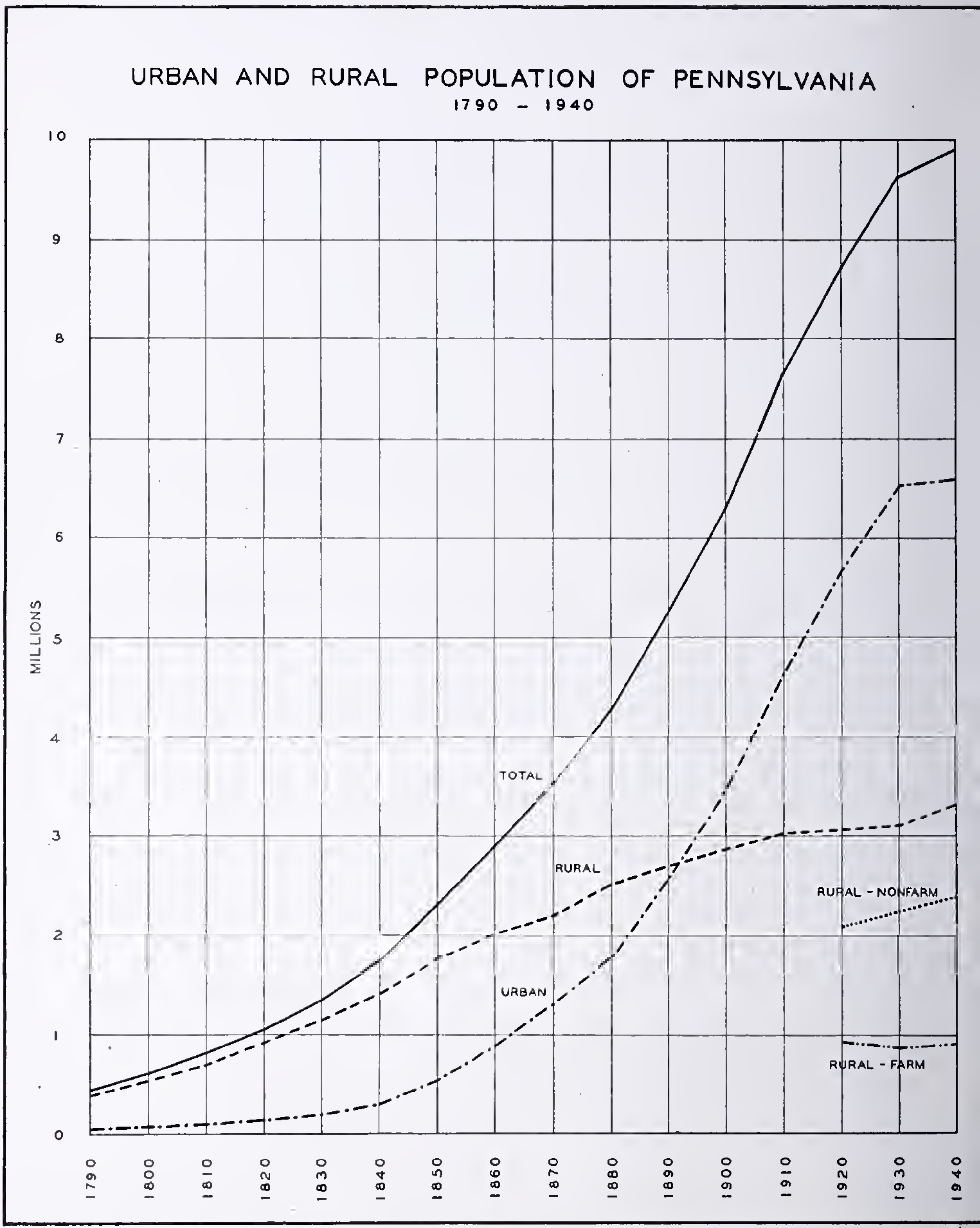
Subheadings of Farm Land do not add up to total Farm Land since some Woodland is also included in Pasture Land.

Publicly Owned Forest and Recreation Land

	Acreage	*Percent of State Area*
Total Forest and Recreation Land	3,148,126	10.8
Federal	474,678	1.6
State	2,636,694	9.1
County and Municipal Parks and Playgrounds*	36,754	0.1

State	*Number*	*Acreage*
State Forest Parks	31	22,776
State Forest Monuments	13	2,425
State Forest Picnic Grounds†	45	2,209
State Forest Vistas	3	38
State Parks	18	71,689
Historical Parks and Shrines	12	481
National		
National Parks	6	3,331
Municipal		
County and Municipal Parks*	552	36,177
County and Municipal Playgrounds	454	577
County and Municipal Forests‡	112	131,296

* Some of this park acreage may be included in county and municipal forests.
† Additional picnic grounds are located in several State parks.
‡ Not included in total of publicly owned land.



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BO

This chart shows the history of Pennsylvania's population growth for a hundred and fifty years. Since 1890 the urban inhabitants have always exceeded those living in rural areas, but between 1930 and 1940 the rural grew faster than the urban population. This trend was reversed again after 1940.

Population and Vital Statistics

The estimates of Pennsylvania's population for 1948 made by the United States Census show a remarkable reversal of the downward trend recorded in the State's growth rate since 1910. If the population growth should continue at the indicated rate to 1950, the State would have achieved an increase of 7.25 percent in this ten-year period, as compared with 2.8 percent between 1930 and 1940.

It is probable, however, that the rate of growth stimulated by the great increase in the birth rate in the past three years will not continue at quite so high a level over the next two years. A reference to the Table of Vital Statistics will show how the increase in births and also the natural increase—a balance of births against deaths—rose in the two years following the Second World War as it had done after the First.

Until 1947 the largest recorded number of births in the State's history had occurred in 1921—a total of 229,452 children having been born in that year. The birth *rate* of 1921 was higher than that of any later year, including 1947, though the births in 1947 reached the record total of 249,103.

Following the Second World War two influences contributed to the high record of births in the State and Nation, the large number in the marriageable group because of the high birth rate following the First World War, and the high percentage of marriages which always has been noted during and immediately after a period of military activity.

The lowest number of births in any time during the past forty years occurred in the year 1933 when only 157,059 children were born.

It is probable that beginning in the late 1950's the State and National birth rates will show a decided drop because of the relatively small number of births in the 1930's.

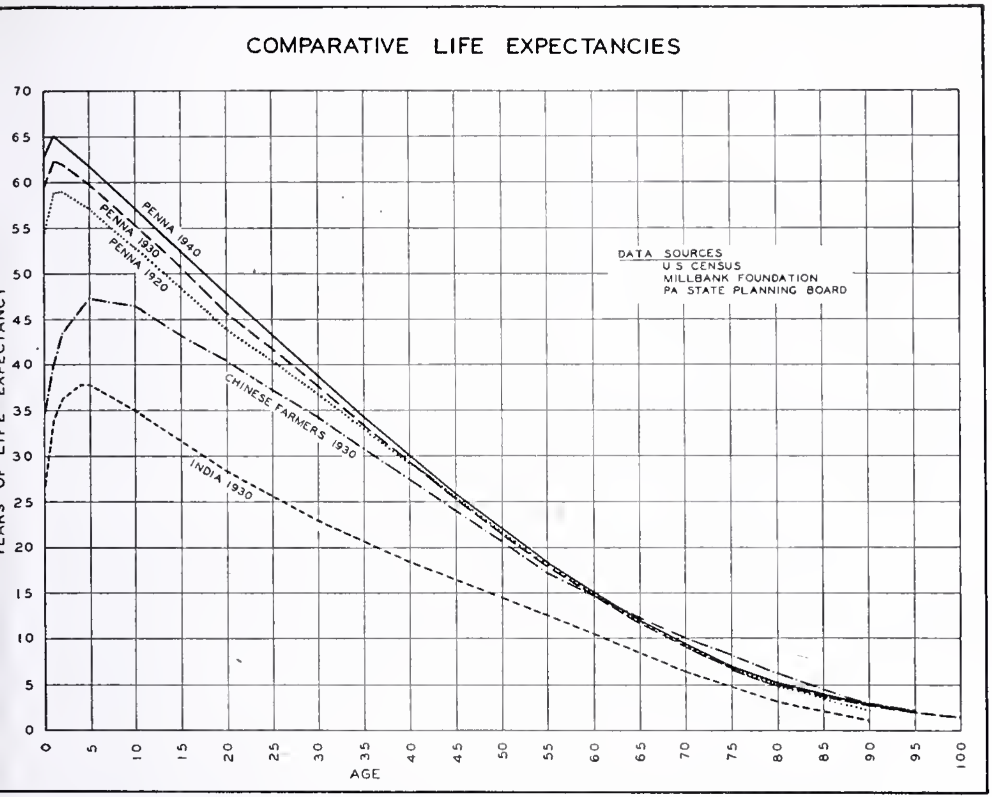
Although our population has increased by more than a million since 1930, the number of deaths has slightly declined as a consequence of the lowered infant mortality and the increased life expectancy at all ages.

The proportion of older persons in the population has steadily grown since the time of the first Census, and has shown a surprising increase in the past twenty years. There were 394,000 Pennsylvanians of sixty-five years or over in 1920, 4.5 percent of the total population. By 1930 the number had increased to 508,000, and the percentage to 5.27; by 1940 to 677,468, and the percentage of the number was 6.84. It is probable that by 1950 the percentage of older people will have increased to 8.5, and that their number will exceed 900,000. So that, while our total population will have gained approximately 20 percent in thirty years, the population of older people will have increased nearly 130 percent.

The proportion of older people to the total will eventually reach a limit, but it is likely that in the foreseeable future there will always be a higher percentage of people of sixty-five years or over in Pennsylvania's population than was ever true in the past.

Questions are frequently asked as to the future growth in the State's population. An examination of what occurred between 1940 and 1948 in the total population and of the rise and fall of births shown in the Vital Statistics Table will make it clear how unreliable such estimates are likely to prove.

For the United States as a whole it is possible to estimate future population on the basis of present trends and have some expectation that the estimate will prove true. For a state or a civil subdivision such estimates are far less reliable since internal migration results from economic and social forces which are not predictable. All that it is possible to say is this: if present long-term trends in births, deaths and life expectancy continue, and no important eco-



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STATE PLANNING BOARD

nomic forces produce unusual movement into or out of the State, Pennsylvania's population would rise to a maximum of 11,200,000 by 1970, and afterwards either stabilize at that point or slightly decline. This is to be regarded, however, not as a prediction, but as a summary of present trends of births, deaths, and migration.

On the basis of the 1948 Census estimate, Pennsylvania has a population density of 231.1 per square mile. This is far higher than the density of many European and Asiatic Nations. France, on the basis of its 1946 population, had a density of 190 per square mile; Greece, 149; and China, 115. The State is not far below the population density of India and Pakistan, which was 246 per square mile in 1941.

The distribution of population is more important to the well-being of the people of an area than absolute numbers. In this respect our State is peculiarly fortunate.

In Pittsburgh and Philadelphia, Pennsylvania has two of the largest cities in the Nation.

This does not imply an undue concentration in great urban centers since Pennsylvania has more small cities and towns than any other state. It has five cities of 100,000 or more, eleven with a population of between 50,000 and 100,000, twelve urban communities between 25,000 and 50,000, seventy-five between 10,000 and 25,000, 112 between 5,000 and 10,000, 140 between 2,500 and 5,000, and in addition contains 640 towns and villages of less than 2,500 population. The State has also a larger number of people residing in small towns than is true anywhere else in our Nation.

We commonly think of New England as a section of our country notable for the number of its towns and villages, but in the number of places under 10,000 Pennsylvania has five and one-half times as many—the exact numbers being 892 such communities in Pennsylvania and 162 in all New England.

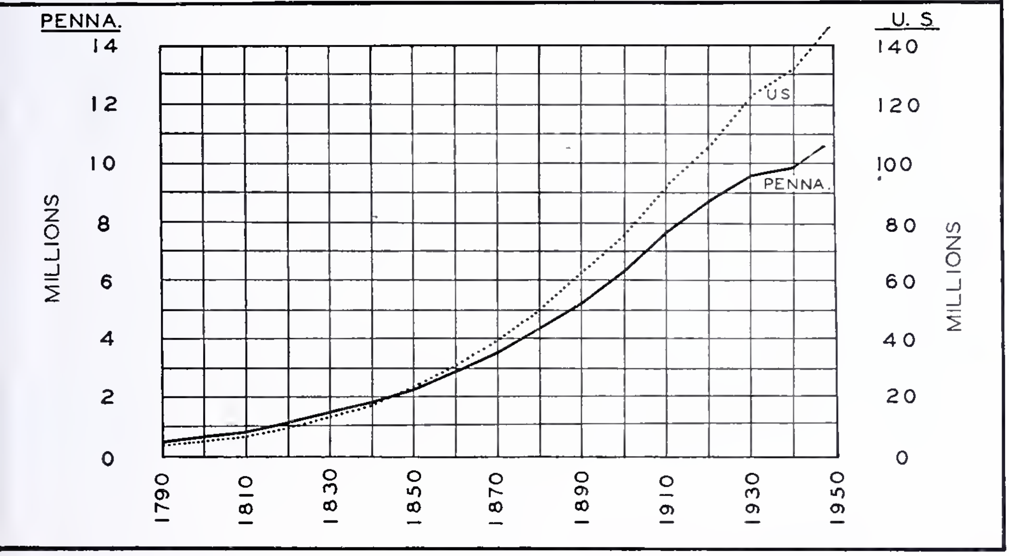
It might be concluded from these figures that Pennsylvania's population dwelt entirely in cities, towns and villages, but this would be far from true. At the time of the taking of the 1940 Census 2,728,085 Pennsylvanians were living in unincorporated territory.

Pennsylvania's people include representatives of almost all the races of the World.

English and Welsh Quakers in the company of William Penn, as well as Irish, Scotch-Irish, and Germans of the Rhineland and the Palatinate all made their way to Pennsylvania before the close of the Seventeenth Century.

In our southeastern counties the English and Welsh predominated. Pennsylvania's German settlers spread out into the rich farm lands south of the Blue Mountains. The Scotch and Scotch-Irish who came a generation later moved into the regions west of the Susquehanna and beyond the Allegheny Mountains. In our coal counties first the Welsh, and afterwards hundreds of thousands of the peoples of eastern Europe found homes and opportunity.

POPULATION TRENDS FOR
THE UNITED STATES AND PENNSYLVANIA



PENNSYLVANIA DEPARTMENT OF COMMERCE, STATE PLANNING BOARD

In Pennsylvania was bred a large part of the rugged pioneer stock which settled the territory west of the Alleghenies in the closing decades of the Eighteenth Century. Pennsylvania also contributed a large share of the thousands who moved west toward the gold fields of California in 1849. Throughout its history the State has always exported people to the less densely settled parts of our Country.

Though millions of Pennsylvanians have migrated to other states, many more millions have remained on their native soil, so that the Keystone State is today second in point of population in our Country, and first in the number of its native white citizens of native parentage.

Pennsylvania

Population—Changes and Density

Year	*Population*	*Change*	*Percent of Change*	*Density per Sq. Mi.*
1800	602,365	......	...	13.3
1810	810,090	207,726	34.5	17.9
1820	1,049,458	239,367	29.5	23.2
1830	1,348,233	298,775	28.5	29.7
1840	1,724,033	375,800	27.9	38.0
1850	2,311,786	587,753	34.1	51.0
1860	2,906,215	594,429	25.7	64.1
1870	3,521,951	615,736	21.2	77.7
1880	4,282,891	760,940	21.6	94.5
1890	5,258,113	975,222	22.8	116.0
1900	6,302,116	1,044,003	19.9	139.0
1910	7,665,111	1,362,995	21.6	169.1
1920	8,720,017	1,054,906	13.8	192.4
1930	9,631,350	911,333	10.5	212.5
1940	9,900,180	268,830	2.8	218.4
1948 (U. S. Census Estimate of Total Population)	10,478,000	577,000	5.8	231.1*

Pennsylvania

Vital Statistics

Year	*Births**	*Deaths**	*Natural Increase*
1929	189,521	117,365	72,156
1930	189,573	111,606	77,967
1931	178,678	111,936	66,742
1932	168,553	109,204	59,349
1933	157,059	106,109	50.948
1934	160,232	109,601	50,631
1935	161,189	108,555	52,634
1936	159,462	112,711	46,751
1937	161,333	114,946	46,387
1938	166,002	107,282	58,720
1939	161,254	108,007	53,247
1940	165,456	111,977	53,479
1941	174,591	106,096	68,495
1942	198,315	109,176	89,139
1943	199,366	115,452	83,914
1944	178,370	110,333	68,037
1945	173,799	109,193	64,606
1946 (By place of occurrence)	219,094	107,156	111,938
1947 (By place of occurrence)	249,103	109,929	139,174

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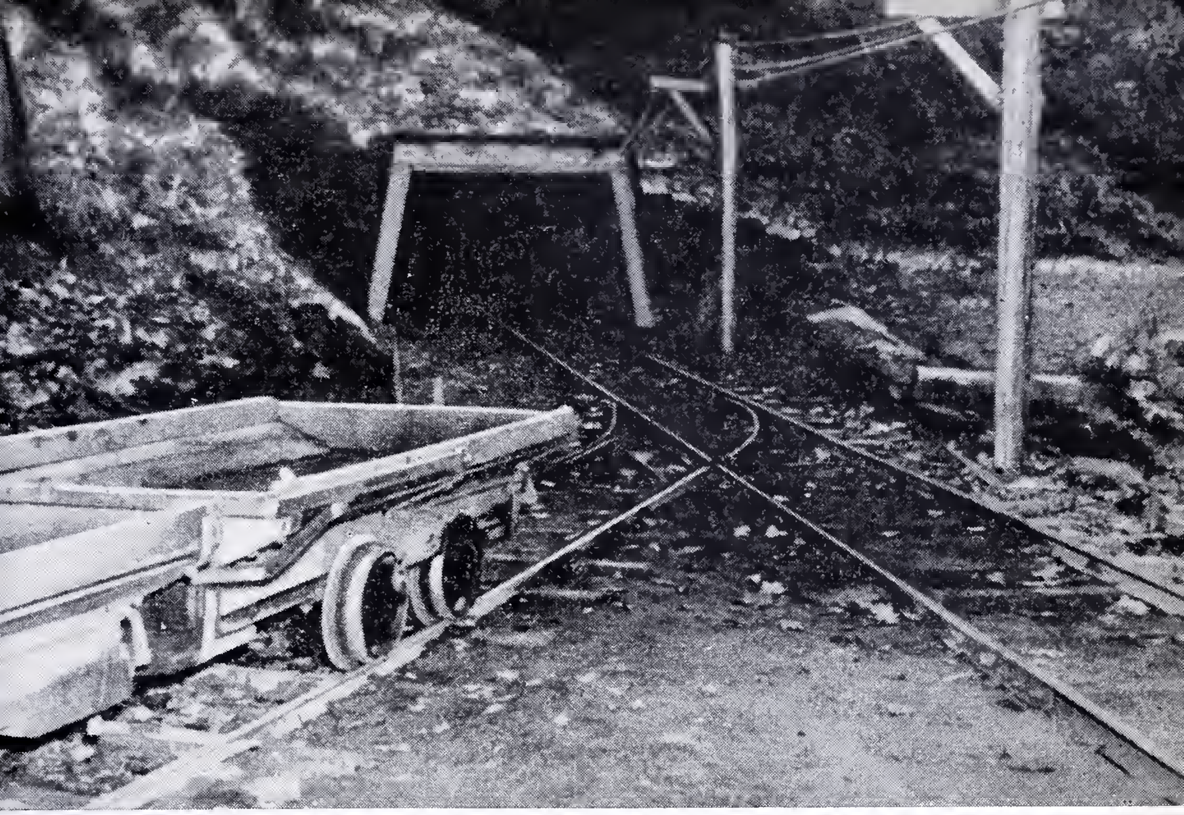
* By residence.

Bureau of Vital Statistics, Dept. of Health.



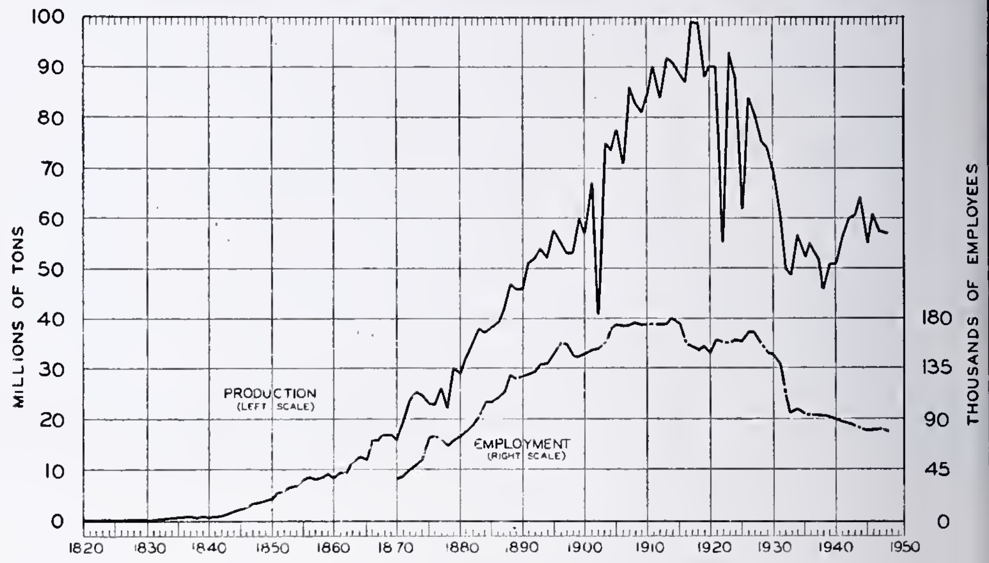
Mineral Products

In the thirty-five years from 1911 to 1946 the value of Pennsylvania's mineral products reached a total of $27,106,000,000. By 1950 the total will exceed $30,000,000,000 at present rates of production.

According to the latest Minerals Yearbook of the United States Bureau of Mines, nearly 18 percent of all United States mineral products during the past thirty-five years has come from the mines, quarries and oil wells of the Keystone State. No other State can come even close to this record.

A list of Pennsylvania's important minerals includes cement, anthracite, coke, pig iron, ferroalloys, natural and manufactured pigments, slate, stone, sulphuric acid from zinc smelters, and cobalt, in all of which the State is America's leading producer. It also includes bituminous coal, lime, and clay, in which Pennsylvania is second, and a great variety of other minerals, such as natural gas, natural gasoline, petroleum, pyrites, silica sand and gravel, gold, silver, copper, graphite, tripoli, and a large output of miscellaneous minerals to a value of approximately $25,-

ANTHRACITE PRODUCTION AND EMPLOYMENT



SOURCE PRODUCTION FIGURES–U S BUREAU OF MINES
EMPLOYMENT FIGURES–PENNA DEPT OF MINES

PENNA DEPT OF COMMERCE
STATE PLANNING BOARD

000,000, making a total for the year 1946 of $1,090,-784,000.

Pennsylvania was the earliest State in our Nation to make full use of its natural resources. Its great Cornwall Iron Mine has been in continuous production for more than two centuries, and is still credited with more than a million tons of ore every year.

The State's Bradford oil field is the oldest in the World. It was in that field that the first commercial oil well, Drake's Well, was drilled in 1859.

For many years Pennsylvania was America's only producer of commercial quantities of coal. The State still leads the Nation in coal production, and mines nearly one-half of the World's anthracite.

The highest point of anthracite tonnage was attained in 1917 when 99,612,000 tons were mined. The 1948 tonnage was 57,052,000.

The year 1918 was the high point for bituminous coal in the State, with a tonnage of 178,551,000. In 1947 the Commonwealth produced 145,880,000 tons.

Pennsylvania's coke production is far greater than that of any other State. It amounts to approximately 31 percent of the National total. In 1947 25 percent of all by-product coke and 89 percent of all beehive coke were produced in the Keystone State. It is on this dominance in the coke industry that Pennsylvania's National leadership in the output of iron and steel has been based.

To produce this coke Pennsylvanians consumed 33,198,826 tons of coal, valued at nearly $181,600,000.

The State's by-product ovens also yielded 248,333,485 thousand cubic feet of gas, 220,727,746 gallons of coke oven tar, 510,491,251 pounds of ammonia, 74,601,390 gallons of crude light oil, and many million gallons of benzol and toluol, as well as other important products basic to the organic chemical industries. Under the old beehive processes of coke production these chemical raw materials and gases were lost.

Coke oven gas is used as a source of heat and power and of valuable hydrocarbons. Coke oven ammonia yields nitrogenous fertilizer. The coal tars and light oils are the raw materials from which a variety of new drugs, dyes, plastics, and industrial chemicals are now derived.

Pennsylvania's petroleum production reached its peak in 1891 with an output of more than 31,000,000 barrels. It fell to a low of 7,400,000 barrels in 1921, but water-pumping has resulted in an increased flow, which in 1948 totalled 12,667,000 barrels. The State's petroleum resources, while not great in comparison with those of several Western States, are important because of the unique physical and chemical qualities of this oil which make it the best known source in the Nation for refined lubricants necessary for the operation of high-speed machinery.

Natural gas has been of particular importance in the Western portion of the State as a fuel for the glass furnaces and as a source of carbon. The largest output on record was 138,000,000,000 cubic feet in 1906. Production fell to 61,000,000,000 cubic feet in 1932 but rose to 99,500,000,000 cubic feet in 1946.

Production of iron ore in 1947 totalled 1,674,000 tons, principally from the Cornwall Mine, which also produces a relatively small yield of silver and gold, and is the chief American source for the metal cobalt.

Pennsylvania

Mineral Production

Production of Basic Products

(Amounts in Thousands of Tons)

	Coal			*Coke*		
Year	*Anthracite*	*Bituminous*	*Total*	*By-Product*	*Beehive*	*Total*
1920	89,598	170,608	260,206	7,730	15,908	23,639
1921	90,473	116,014	206,486	5,303	4,466	9,769
1922	54,683	113,148	167,831	7,152	6,840	13,992
1923	93,339	171,880	265,219	9,186	16,438	25,624
1924	87,926	130,634	218,560	8,426	8,501	16,927
1925	61,817	136,928	198,745	9,853	9,574	19,427
1926	84,437	153,042	237,479	11,201	10,722	21,923
1927	80,096	132,965	213,061	11,061	5,716	16,777
1928	75,348	131,202	206,550	13,475	3,442	16,917
1929	73,828	143,516	217,344	14,489	5,368	19,857
1930	69,385	124,463	193,848	12,529	2,011	14,540
1931	59,646	97,659	157,305	7,525	855	8,380
1932	49,855	74,776	124,631	4,038	506	4,544
1933	49,541	79,296	128,837	6,170	670	6,840
1934	57,168	89,826	146,994	6,834	721	7,555
1935	52,159	91,405	143,564	8,078	564	8,642
1936	54,580	109,887	164,467	12,571	1,213	13,784
1937	51,856	111,002	162,858	13,701	2,559	16,260
1938	46,099	77,705	123,804	7,119	482	7,601
1939	51,487	92,584	144,071	10,994	1,126	12,120
1940	51,485	116,603	168,088	14,862	2,550	17,412
1941	56,368	130,240	186,608	15,632	5,891	21,523
1942	60,328	144,073	204,401	16,310	7,309	23,619
1943	60,643	141,050	201,693	16,519	6,934	23,453
1944	63,701	146,052	209,753	16,977	6,171	23,148
1945	54,934	132,965	180,089	15,255	4,584	19,839
1946	60,507	125,155	202,880	12,795	4,027	16,822
1947	57,190*	145,880*	......	16,475	5,913	22,388
1948	57,052*	132,550*	......	....	5,492*	.....

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* Preliminary figures.

Sources:

United States Bureau of Mines.
Pennsylvania Department of Mines.

Pennsylvania

Mineral Production

Production of Basic Products

Year	*Iron Ore Tons*	*Lime Tons*	*Stone Tons*	*Petro-leum Bbls.*	*Cement Bbls.*	*Electric Energy by Public Utilities (Thousands of K.W.H.)*
			(Amounts in Thousands)			
1920	1,193	784	14,297	7.438	28,294	4,021,000
1921	288	510	9,023	7.418	26,403	3,801,000
1922	863	720	12,732	7,425	33,248	4,265,000
1923	1,108	773	15,679	7,609	38,386	5,110,000
1924	1,391	700	14,560	7,486	41,629	5,433,000
1925	1,679	795	16,125	8,097	42,466	6,249,000
1926	1,223	794	16,629	8,961	42,836	7,202,000
1927	1,299	814	16,015	9,526	44,197	7,626,000
1928	1,164	834	16,547	9,956	41,736	7,410,000
1929	1,248	783	18,169	11,820	39,980	8,075,000
1930	1,099	634	15,138	12,803	38,254	7,840,000
1931	426	497	11,124	11,892	28,820	7,233,000
1932	89	374	10,842	12,412	16,045	6,367,000
1933	305	430	12,802	12,624	12,438	6,767,000
1934	601	435	15,251	14,478	15,439	7,453,000
1935	1,116	532	8,570	15,810	15,326	8,225,000
1936	1,307	661	15,814	17,070	21,827	9,455,000
1937	1,945	693	16,091	19,189	22,654	10,446,000
1938	2,040	532	12,134	17,426	20,233	9,951,000
1939	2,237	691	15,744	17,382	24,931	11,024,000
1940	2,269	833	19,278	17,353	26,639	12,517,000
1941	2,532	1,003	23,507	16.750	33,338	14,245,000
1942	2,248	1,030	23,132	17.779	35,056	16,027,000
1943	2,275	1,021	20,000	15,757	20,116	17,466,000
1944	1,960	1,026	18,175	14,118	12,166	17,623,000
1945	1,727	904	17,708	12,515	15,283	17,350,000
1946	1,520	972	18,884	12,996	30,377	16,881.000
1947	1,674	...	.....	12,696	36,258	19,825,000
1948	....	...	.....	12.667*	.....	22,018,000*

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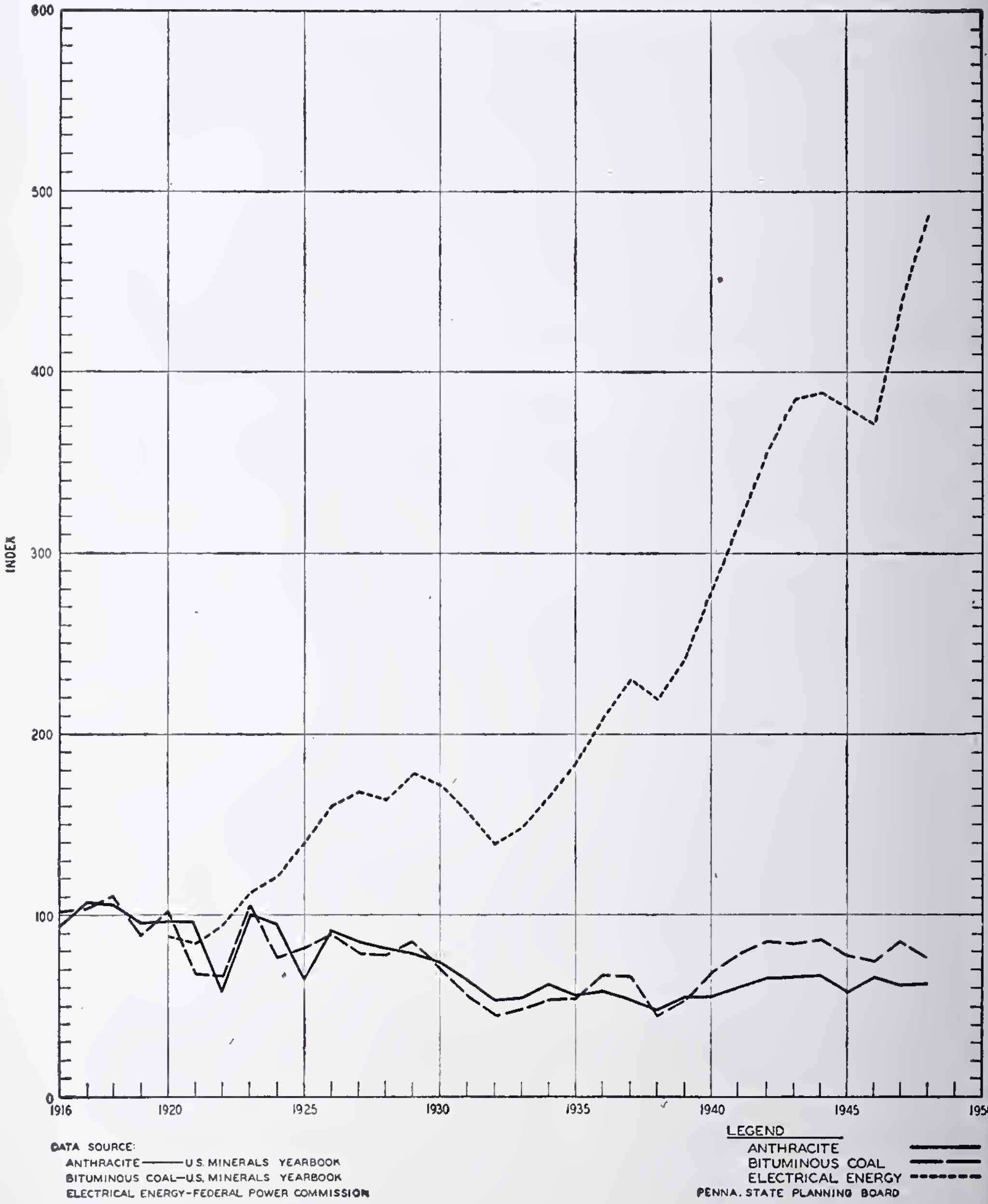
* Preliminary figures.

Source:

Iron Ore and Cement—Pennsylvania Department of Internal Affairs;
Petroleum, Lime, Stone—United States Bureau of Mines;
Electric Energy—Federal Power Commission.

INDICES OF THE PRODUCTION OF COAL AND ELECTRIC POWER IN PENNSYLVANIA

(BASE: 1916 TO 1920 YEARLY AVERAGE)



DATA SOURCE:
ANTHRACITE——U.S. MINERALS YEARBOOK
BITUMINOUS COAL—U.S. MINERALS YEARBOOK
ELECTRICAL ENERGY-FEDERAL POWER COMMISSION

PENNA. STATE PLANNING BOARD

Energy Production

In the total production of the fuel energy on which we depend for the heating of our homes, the operation of almost all our transportation, and the turning of the wheels of industry, Pennsylvania exceeds every state in our Nation. In addition to its coal production, which is greater than that of any other state, there is also a sizable output of energy from our natural gas and petroleum wells, and from our many sources of water power.

Energy output is most conveniently measured by the amount of heat needed to raise a pound of water one degree in temperature. This is called a British Thermal Unit. One pound of anthracite, for instance, if completely converted into heat could raise 13,600 pounds of water one degree.

A recent study of the State's energy output made by the State Planning Board shows that Pennsylvania's output of energy in the last year for which complete figures are available (1943), was equal to 5,514 trillion British Thermal Units. This is a figure almost too large for the human mind to digest. It means that the heat energy produced by our State in one year, if completely used, would raise 15 billion tons of water from the freezing to the boiling point.

Perhaps it would be easier to comprehend the vital contribution which our State makes to the activities of our Nation if, as one journeys across the continent from the Atlantic to the Pacific, he would take time to realize that nearly one-sixth of all the energy that moves our trains, lights our cities, and provides the enormous power requirements of the busiest Nation in the World, comes from the mines, the wells, and the waterfalls of the Keystone State.

Pennsylvania is the second largest producer among the states of electric energy by public utilities. It is the largest producer of non-utility electric energy, and the largest producer of electric energy from the burning of fuel.

As the leading coal producing State of the Union, the Commonwealth also provides an important part of the source of electric energy generated by many of its neighbors.

These facts are indicative of the tremendous reserves of power available for the manufacturers of the Commonwealth. They have made good use of these resources.

In 1946 the factories and mines of the Commonwealth used nearly one-ninth of all the electricity employed by the industries of our Nation. The total of 14,404,292,000 kilowatt-hours far exceeded that of any other state. It was greater by three billion kilowatt-hours than the total energy consumption of all the states on the Pacific Coast.

The iron and steel plants of our State are the leading users of electric energy, with a total in 1946 of nearly five billion kilowatt-hours. Next comes coal mining, with two and a half billion; next, our quarries and glass works, with 1,228,000,000; and then our oil wells and coke ovens, our paper mills, our chemical plants, our food packers, and our textile mills.

Pennsylvania's total electric production of 2,545,000,000 kilowatt-hours for the month of December in 1948 represents an increase of more than 8 percent over its output in the same month of the preceding year, and is the highest monthly total ever attained.

Pennsylvania has several important installations for the generation of hydro-electric power. The total from water driven generators in 1947 was 2,014,693,000 kilowatt-hours, which was 10.2 percent of the State's total electrical output, although only 2.6 percent of the National output of hydro-electric energy.

On the Pennsylvania Turnpike

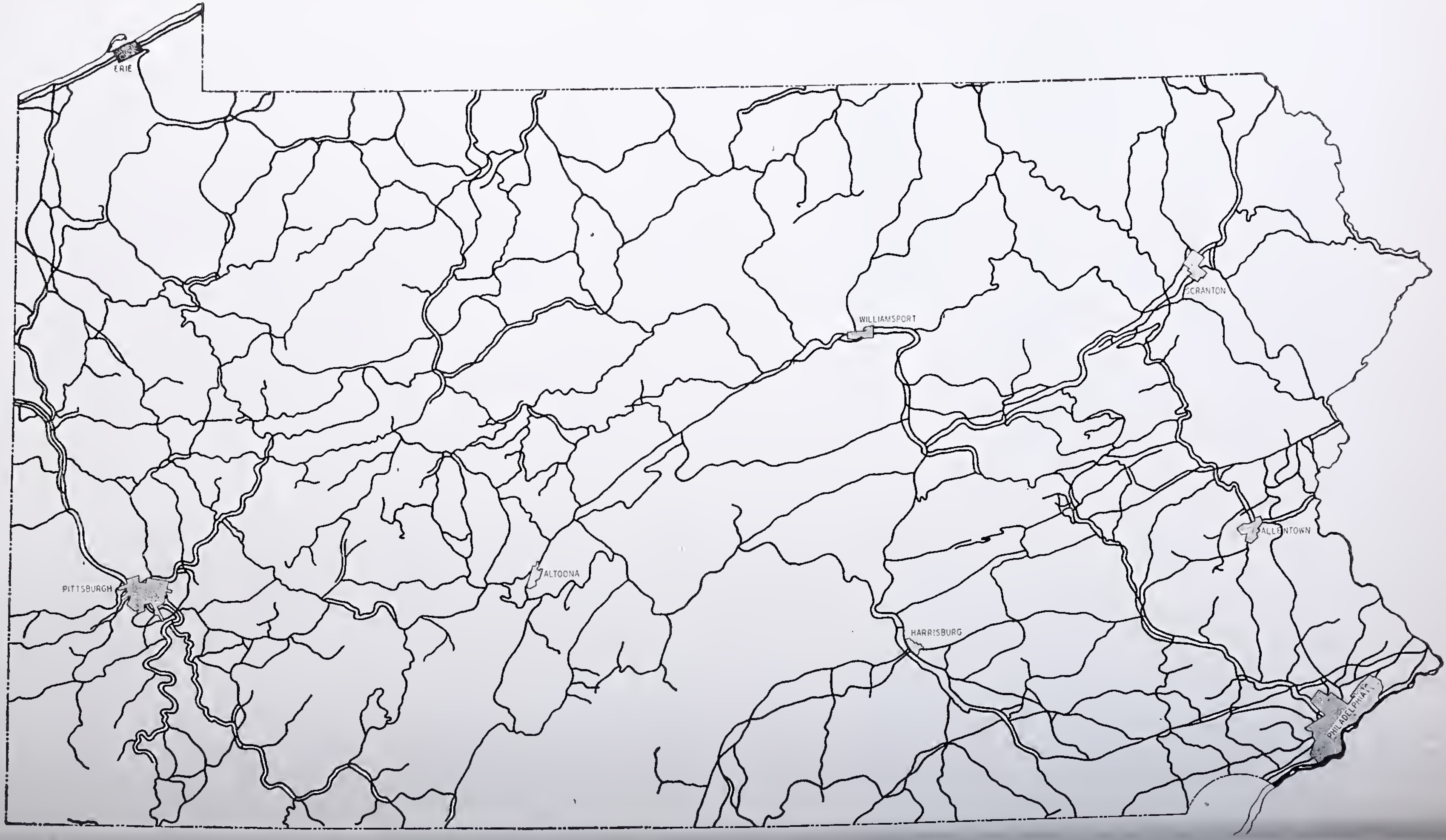
Transportation and Communication

Pennsylvania has always been a pioneer in the field of transportation.

The first hard-surfaced highway in the United States was constructed between Philadelphia and Lancaster between 1792 and 1796. This stone-surfaced roadway made possible for the first time the maintenance of a satisfactory stage service between Philadelphia and what was then Pennsylvania's leading interior city. It also led to the building of numerous taverns and relay stations along the whole length of the highway. It established an epoch-making travel time of only 12 hours between the two cities. For this journey the stage fare was $3.50.

This speed of travel had nearly been equalled on the rougher road between Philadelphia and New York by a vehicle known as the "Flying Machine" which was able to cover the 90 miles between the Nation's two greatest cities within one day, with three changes of horses. Though this vehicle was extremely light, the pace was so rapid that sometimes the horses died in harness during the trip.

RAILROADS IN PENNSYLVANIA



Toward the beginning of the 19th Century and indeed from the earliest history of American travel the break-neck pace at which diligences were driven along those rough Pennsylvania roads excited the mingled admiration and terror of travelers from foreign lands. Speeds as high as seven miles an hour were sometimes attained on the downhill sections of these highways. But collisions and encounters with large boulders and stumps caused numerous accidents, and many a sprained wrist and broken kneepan resulted when passengers were hurled from light two-wheelers proceeding at this dizzy pace.

As our highway systems gradually pushed West and road improvement became of greater and greater public importance, it finally became possible to make the entire journey from Philadelphia to Pittsburgh in less than six days—the stage fare for the trip being $20.00.

From this beginning it may seem a far cry to the State's modern highway system of nearly 100,000 miles, which includes the Pennsylvania Turnpike—the finest all-weather four-lane protected road on our Continent. The super-highway tunnels through the Allegheny Mountains, and is now being extended to span the entire State from New Jersey to Ohio.

In the field of railroad transportation the Commonwealth is equally progressive.

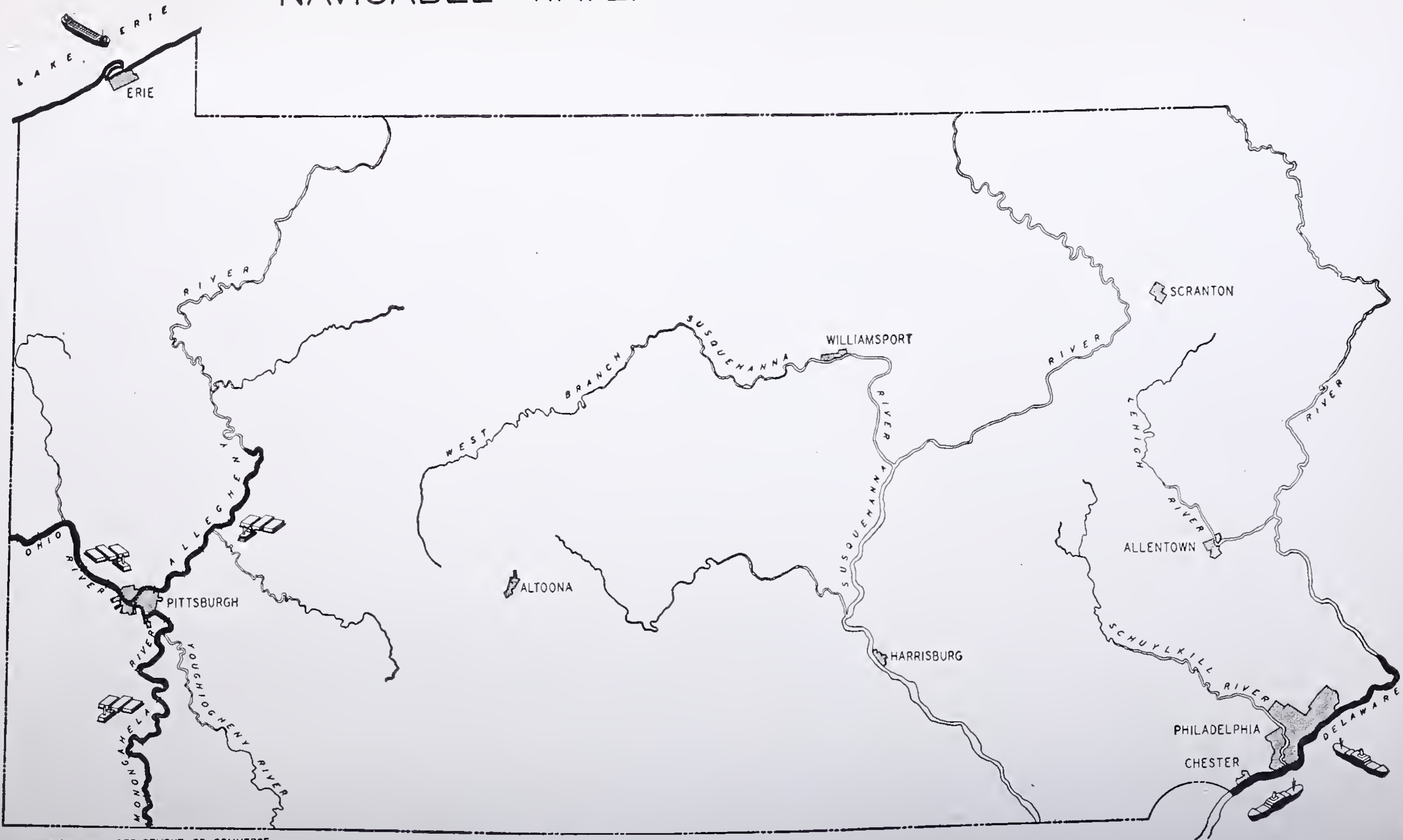
As early as 1809 a horse drawn railway with iron wheels was in use over a very short track at Leiperville, not far from Philadelphia.

When the Mauch Chunk Railway was completed in 1827 for the transportation of coal from the mines by gravity and mule power, its nine miles of track formed the longest and most important railway in our Nation.

In 1829 the first steam locomotive ever used in America made two trips between Carbondale and Honesdale on rails laid by the Delaware and Hudson Canal Company.

The Philadelphia-Columbia line, spanning a distance of 81 miles, was completed in 1834 through an appropriation of $2,000,000 by the Pennsylvania Legislature. This railroad was chartered in March, 1823 as a steam road for the transportation of passengers and freight. The charter was granted two years before the opening of the first passen-

NAVIGABLE WATERWAYS IN PENNSYLVANIA



PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

ger-carrying railway in the World—a 38-mile horse-drawn project in Great Britain—and seven years before the opening of the Liverpool and Manchester Railroad in that country, which was the first regular steam-driven line.

When coal began to be used as a fuel for operating steam locomotives, it was Pennsylvania's anthracite which supplied the motive power. The conveniences afforded by this concentrated fuel provided a great stimulus for the extension of American railroad systems throughout all the inhabited parts of our Country. During the later years of railroad development Pennsylvania's bituminous coal succeeded the State's anthracite as the chief source of motive power.

Since those early days Pennsylvania has remained in the forefront of railroad development and, despite its relatively small area, has the third longest track mileage in the Nation—a total of 11,451 miles, as reported to the Department of Internal Affairs by the State's 161 railroad companies.

Every county in Pennsylvania, but one, is served by these roads which, together with our system of State highways and the Pennsylvania Turnpike, provide the people of the Commonwealth with the best transportation facilities available anywhere in the Nation.

Pennsylvania is not only a leader in railway development. It has always been the foremost user of America's railway facilities. In the year 1948 the State accounted for 417,000,000 tons of revenue railroad freight, more than one-seventh of all the freight traffic transported by the Class I steam railways of the United States.

Pennsylvania's shipments of coal and steel provided the raw material and power for the industries of half a dozen states and yet the freight record of the Commonwealth in manufactured and miscellaneous goods also stands highest in our Nation.

Just how important Pennsylvania's freight tonnage is to the American economy is shown by the fact that in 1948 the State shipped and received more carload freight than the combined tonnage of the three Pacific States and the eight Mountain States, in addition to Oklahoma and Texas.

One of the greatest advantages of Pennsylvania's geographic location is the fact that it is the only State with outlets from its own ports to the Atlantic, the Gulf of Mexico, and the St. Lawrence. The Port of Erie connects the State by water with Canada and the Great Lakes system. The Port of Pittsburgh provides access to the Mississippi River and the Caribbean Sea. The Ports of Philadelphia and Chester are our State's outlets to the Atlantic.

In total volume of water-borne commerce Philadelphia is the second most important port on the Atlantic Coast.

By virtue of its position at the head of the Ohio, and at the juncture of the Monongahela and Allegheny Rivers, Pittsburgh is the busiest interior river port in the United States.

Erie is an important center for the Great Lakes fisheries, and maintains a flourishing trade in grain and coal with other Lake ports, both in the United States and Canada.

As of January 1, 1949, Pennsylvania had 203 civil airports, serving all of its principal cities and many of its rural communities. The State has a very high rating for air safety.

The record of telephones in use is a measure of the progress of our civilization and of the unifying forces which make possible a democratic government despite all our differences of opinion.

Philadelphia's Waterfront

According to the latest report of the Federal Communications Commission, there were 2,524,942 telephones in use in Pennsylvania on the first of January, 1948. On January 1, 1946, only two years before, the total had been 1,835,782.

As of January 1, 1947, there were 1,378,000 telephones in use on the whole continent of South America—more than a million fewer than in the Commonwealth of Pennsylvania. The South American continent embraces an area of 6,937,551 square miles, and contains approximately 84,000,000 inhabitants, while Pennsylvania contains 45,333 square miles, and has a population of 10,689,000. The Union of the Soviet Socialist Republics, with 8,473,000 square miles of territory and a population of approximately 211,000,000 had some 1,500,000 telephones in 1947, which is also more than a million fewer than our Commonwealth has today.

These statistics afford one example of the intensive nature of the civilization in which we live and of that American passion for mutual communication and mutual un-

The Harbor of Erie

derstanding which has made possible the growth of a great democracy.

Pennsylvania was a pioneer in both the radio and motion picture industries. The first commercial broadcasting station in the World was located in Pittsburgh. The first projected moving picture was exhibited in Philadelphia in 1870.

As a result of experiments conducted at the University of Pennsylvania in 1885 Muybridge made a series of instantaneous photographs of moving objects, and afterwards developed an instrument for projecting such pictures on the screen.

The first moving picture studio was opened in Philadelphia in 1898, and the first moving picture theatre, in Pittsburgh in 1905.

There are today more than 1,500 moving picture theaters in Pennsylvania, and 139 radio or television stations, a number which is constantly growing.

On Pennsylvania's Hemlock Trail

Pennsylvania

Transportation and Communications

Transportation

Highways

Improved and Unimproved Highways—1947	99,941 miles
Improved	61,111 miles
Unimproved	38,830 miles
Total State Funds disbursed for Highways—1947	$95,809,000
Automobile Registrations—1947:	
Passenger Cars	2,024,119
Commercial Cars	407,591
Motor Buses	12,114
Motorcycles	26,375
Operator Licenses	3,404,483
Scheduled Motor Carriers	463

Railroads

Companies Operating in Pennsylvania—1946 (Listed)	71
Systems Operating in Pennsylvania—1946	15
Total Railroad Mileage in Pennsylvania—1947	11,475
Revenue Freight Carloadings—1948:	
Tons Originated	239,700,000
Tons Terminated	177,471,000

Ports

Philadelphia, including Chester	Delaware River
Erie	Lake Erie
Pittsburgh	Ohio River
Civil Airports—January 1, 1949	203
Scheduled Air Lines serving major Airports	8

Communications

Telephone

Line Mileage in Pennsylvania—1948	8,137,324
Telephones in Service	2,524,942

Telegraph

Line Mileage in Pennsylvania—1948	69,960

Radio

Licensed AM Stations—1949	103
Licensed FM Stations	30
Licensed Television Stations	6

The first Government licensed radio station in the United States was Station KDKA of Pittsburgh, November 7, 1921.

Publications

Periodicals	419
Newspapers	564

Industrial Production and Employment

In 1947 Pennsylvania's industrial production was valued at $16,480,437,400, more than twice the amount recorded for the year 1929.

Wages and salaries totalled $4,703,384,200, which is also a new all-time peak for the State, although the number of employes in industry, 1,779,705, was lower than it had been at the height of the war in 1943.

The diversity and balance of Pennsylvania's industrial output are among its most remarkable characteristics. For though metals and the various metal industries are of overwhelming importance in most sections of the State, the production of foods has shown a steady growth and passed a value of two billion dollars in 1947. Textiles is a close third with an output worth $1,942,743,300. Chemicals, which include the important oil refineries along the Delaware, yielded $1,344,080,300; mine and quarry products, $1,097,001,500. Printing and paper industries, which have grown steadily in value and employment over a period of thirty years, passed the $889,000,000 point.

Leather and rubber goods, and clay, glass, and stone products each yielded us more than $450,000,000. The tobacco industries yielded $158,000,000, and the large class of miscellaneous products, which includes shipbuilding and coke refining, more than $663,000,000.

Chief among the metal products and of primary importance in the industrial pattern of the State is the production of iron and steel.

The value of the products of Pennsylvania's iron and steel industries is nearly one-fourth that of the entire manufacturing of the State. For more than a century the Commonwealth has led the Nation in its steel and iron output, and for more than a half century its production has been greater than that of any nation in the World, except our own.

How important Pennsylvania steel has been to the United States in years of peace and war is illustrated by a simple comparison. In 1943, when the fortunes of war largely turned on the ability of the United States to produce at high speed the ships and guns needed to equip the armies of the United Nations, Pennsylvania produced nearly 27,700,000 tons of steel. This was more than the output of Germany, and nearly equalled the combined output of Germany and Japan. It was twice that of Russia, and nearly twice that of Great Britain. It was obviously a critical factor in the victory of the United Nations in the Second World War.

Pennsylvania's steel-producing capacity, which increased more than that of any other state during the war years, is far greater than the demands of all the State's industries, so that in 1947 the surplus of manufactured iron and steel shipped to other states was more than 10,000,000 tons. This compared with a surplus of approximately 6,100,000 tons from Ohio, the next largest steel producer.

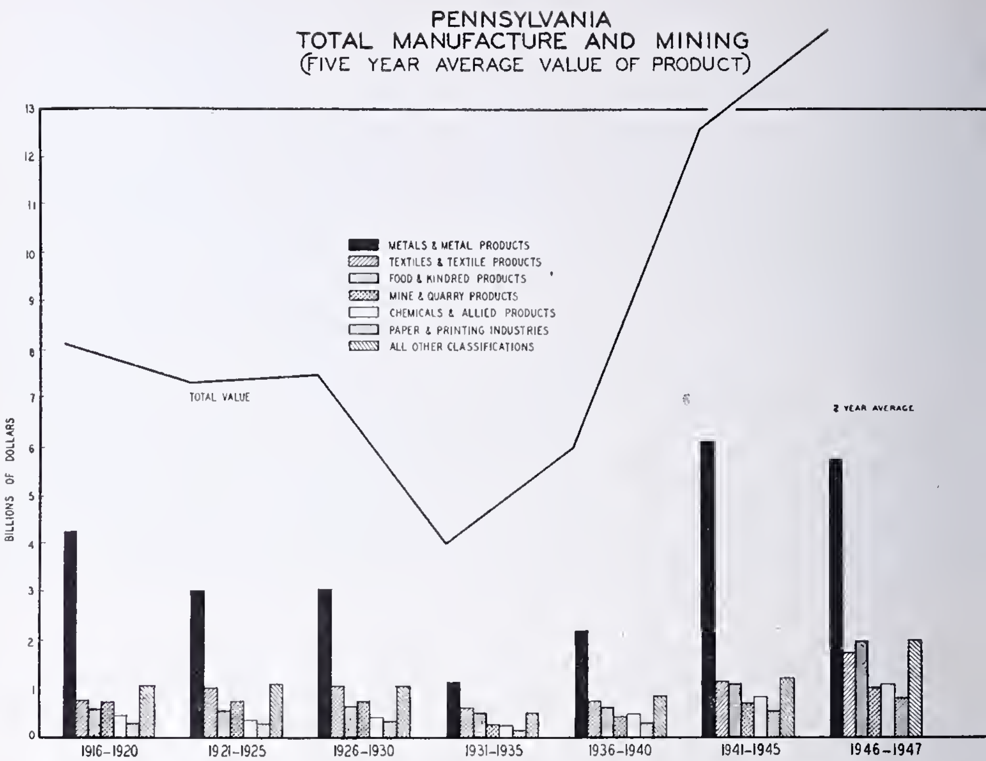
In this respect Pennsylvania's industries are in a far different position from those of many other of the great manufacturing states. Michigan with its great automobile industries consumes nearly 4,300,000 tons of steel more than it produces. New York has a steel shortage of more than 2,000,000 tons. New Jersey and New England are also important steel deficit areas, and so, too, are Texas and California.

Pittsburgh's Golden Triangle

Because of its position in the center of a great bituminous coal field, and at the junction of two important rivers, Pittsburgh early established a leadership in the steel industry which has been challenged by no other section of our Nation. The 18,736,000 tons of steel-producing capacity, accredited to the Pittsburgh district in 1947, was 70 percent of the capacity of the entire State—the other large producing centers being Bethlehem, Erie, Johnstown, Coatesville, and the Harrisburg-Steelton area.

Fifty years ago steel production was a relatively simple process since the product was originally only a controlled combination of carbon and iron. Modern steel is a far more complex material. Hardness, toughness, and resistance to high temperature and to continued stresses have been built into the various products of steel mills through the addition of nickel, vanadium, columbium, and other metallic elements. A modern automobile employs dozens of different types of alloy steel to provide the elasticity and the resistance to wear or temperature needed in its body or in its moving parts.

The greatest of all modern improvements in steel manufacture, and one believed for a long time to be impossible, was the discovery of alloys which produced a steel highly



PENNA DEPT OF COMMERCE · STATE PLANNING BOARD

resistant to stain or rust, or to the attack of corrosive chemicals. From being merely a structural material, steel thus became a material of innumerable uses in the manufacture of consumer goods and in the arts. Stainless steel today has become an accepted and indispensable material in industry and the home.

In all these improvements and developments Pennsylvania has had a foremost part and, while other industries have assumed greater and greater importance through the course of the years, our output of the ferrous metals based on Pennsylvania's equally important leadership in the production of coal and coke has never yet been challenged as the largest single contribution made by any state in providing the raw materials for American industry.

The heavy metals industries are, however, only one of the several important industries in which the State has established a first place. It also leads in the number of its textile mills and in the production of a great variety of textile products.

Among Pennsylvania's "firsts" are full-fashioned hosiery, knitted underwear, lace goods, rayon, men's and boys' shirts and underwear, carpet yarns, linoleum, and the weaving of silk and rayon fabrics. Textiles are second to steel in employment among the State's productive industries.

These great textile industries are the result of a steady growth, beginning with the early Swedish settlers along the Delaware. These first colonists raised sheep, spun and wove wool, grew flax and produced fine linens.

Penn's enlightened policy of encouragement to textile industries led to the setting up of a linen factory in Germantown which was the second textile plant in America.

A part of Pennsylvania's success in the early production of yarn and thread was due to the invention of John Antes, a Moravian Missionary, born in Montgomery County in 1740. He devised a yarn distributor for the spinning wheel which greatly increased the speed of production of fine thread, and in Bethlehem at the Moravian settlement the spinning and weaving of cotton hemp and wool became an established industry in early Colonial days.

It was under the leadership of Benjamin Franklin in 1769 that the silk industry was first established in Pennsylvania. Mulberry trees were planted at various points in the city of Philadelphia, and by 1771 more than a ton of cocoons had been unreeled at the silk thread plant in that city. So quickly was this industry developed that silk raised in 1770 by Susanna Wright, Quakeress of Lancaster County, was made into a court dress for the Queen of England.

Before the time of the Revolution Samuel Wetherill, a Quaker merchant of Philadelphia, had established a factory to make woolens, cottons and linens with the aid of what was probably the first spinning jenny ever to be introduced into America. It was from Wetherill's factory that the cloth was provided to make uniforms for the soldiers of the Continental Army.

The printing and publishing industry of Pennsylvania has a long and honored history that extends back to the famous 18th Century Philadelphia printing shops of

Christopher Sauer, William Bradford, and Benjamin Franklin.

The first successful type foundry in America was established in Philadelphia. The first books and newspapers west of the Alleghenies were published in Pittsburgh.

In recent years the industry has maintained a remarkable growth and has provided employment for a continually increasing number of Pennsylvania workers. Even in the darkest days of the 1932 depression, employment in printing and publishing was far better maintained than in almost any other branch of Pennsylvania enterprise, and stands today at the highest level it has ever attained.

In our Commonwealth are published more than 560 daily and weekly newspapers and more than 400 magazines or journals. One Pennsylvania newspaper has the largest circulation of any evening newspaper in the United States. Two Pennsylvania magazines are among the most popular in the World. The best known musical magazine in America is published in Pennsylvania, as well as many outstanding legal, medical, scientific, educational, and agricultural periodicals.

In the seven years ending September, 1947, there was a net gain of 29,682 business enterprises among Pennsylvania's employers of labor. This gain of nearly 30,000 establishments is one more evidence of the economic health of the Keystone State; particularly, since the period covered includes only two postwar years.

Because of the enlistment of many proprietors of the State's enterprises in the armed forces and the wartime difficulty in securing labor, there was a loss in business establishments during the years 1942 and 1943. Beginning with 1944, however, the addition of new enterprises has occurred at an accelerated rate. Preliminary figures covering the two postwar years 1946 and 1947 indicate a net gain of more than 2,100 manufacturing enterprises. This does not include transfers, or enterprises which have resumed activity in the course of the two years, but only a balance of new firms against those that have gone out of business.

On the same basis 1,495 wholesalers, 319 retail apparel stores, 1,855 eating and drinking places, 1,713 food stores, and 821 gasoline stations have been added. In the field of general merchandising and in stores dealing in both wholesale and retail goods, in automobiles, and miscellaneous merchandise, the net gain was 2,796 new establishments.

This increase in new employers is one of the most encouraging indices as to Pennsylvania's future growth. It is from enterprises, often begun in a small way and carried on for a while by a few individuals, that some of the industrial giants now thriving in Pennsylvania had their beginning. In fact, that type of growth is a typical Pennsylvania pattern.

According to the United States Census, Pennsylvania manufacturing establishments operated by men working alone without any employed helpers produced more than $15,760,000 worth of goods in the not very prosperous year of 1939. Plants employing 20 workers or less produced goods valued at $400,928,000, and plants employing 50 workers or less produced goods valued at $759,641,000.

That the operation of small plants in Pennsylvania can be conducted with great success is shown by the fact that the value added by manufacture per dollar value of product in plants employing 50 workers or less was greater—on the average—than in plants employing from 1,000 to 2,500 wage earners, and there is indication in more detailed records of the State's production maintained by the Department of Internal Affairs that the small types of manufacturing establishments in many lines of enterprise can be operated with as high a relative efficiency as very large plants.

Pennsylvania

Manufacturing and Extractive Industries

Five-Year Averages

State Totals

Dates	*Employment*	*Compensation*	*Value of Product*
1916-1920	1,561,610	$1,820,556,400	$8,231,312,000
1921-1925	1,486,479	2,005,405,000	7,409,243,600
1926-1930	1,481,526	2,167,024,800	7,574,097,000
1931-1935	1,186,647	1,266,108,500	4,057,580,200
1936-1940	1,361,108	1,745,040,500	6,057,033,000
1941-1945	1,763,792	3,688,946,500	12,795,493,000
1946-1947*	1,769,132	4,336,115,500	14,714,048,700

Operating Ratios

	Value of Product Per $1.00 Compensation	*Average Annual Compensation Per Employe*†
1916-1920	$4.52	$1,166
1921-1925	3.69	1,349
1926-1930	3.50	1,463
1931-1935	3.20	1,067
1936-1940	3.47	1,282
1941-1945	3.47	2,091
1946-1947*	3.39	2,451

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* Two-year average.

† Includes part-time workers.

Data from Penna. Dept. Internal Affairs.

Percent of Total Employment by Major Industrial Classifications

	1920	*1929*	*1933*	*1940*	*1943*	*1947*
Total all Industries	100.0	100.0	100.0	100.0	100.0	100.0
Chemicals and Allied Products	2.7	2.5	3.2	2.6	2.8	3.1
Clay, Glass and Stone Products	3.8	3.9	3.4	3.7	3.2	3.9
Food and Kindred Products	4.3	4.9	6.9	6.8	5.7	6.8
Leather and Rubber Goods	2.9	2.3	2.5	2.6	2.1	2.5
Lumber and Its Re-Manufacture	2.1	2.2	1.8	1.8	1.4	2.0
Metals and Metal Products	33.8	31.1	24.5	34.5	41.2	40.0
Mine and Quarry Products	19.7	20.2	19.5	14.2	10.2	10.5
Paper and Printing Industries	3.8	4.8	5.6	5.4	4.1	5.3
Textiles and Textile Products	13.4	18.3	22.7	19.0	14.2	17.0
Tobacco and Its Products	2.5	1.9	1.9	1.3	1.0	1.2
Miscellaneous Products	6.0	4.0	4.3	5.2	11.1	4.9
Railroad Repair Shops	5.1	3.9	3.7	2.9	3.0	2.8

Pennsylvania
Manufacturing and Extractive Industries
Five-Year Averages
1916—1947
Major Industrial Classifications

Dates	*Employes*	*Compensation*	*Value of Product*
	Chemicals and Allied Products		
1916-1920	47,469	$56,662,200	$474,508,000
1921-1925	34,652	51,244,700	391,069,000
1926-1930	36,841	62,345,500	443,443,000
1931-1935	37,194	55,096,600	336,293,000
1936-1940	39,998	67,725,800	464,732,000
1941-1945	49,808	113,026,300	859,149,000
1946-1947*	54,368	155,237,500	1,176,144,000
	Clay, Glass and Stone Products		
1916-1920	62,709	$65,145,200	$180,799,000
1921-1925	58,675	75,979,600	218,381,000
1926-1930	58,248	81,462,600	229,258,000
1931-1935	41,526	39,041,900	111,111,000
1936-1940	49,149	61,809,600	178,696,000
1941-1945	59,003	107,295,900	294,724,000
1946-1947*	67,450	159,166,200	418,309,000
	Food and Kindred Products		
1916-1920	64,538	$67,020,300	$578,538,000
1921-1925	69,188	88,561,300	580,476,000
1926-1930	73,076	103,640,000	640,373,000
1931-1935	78,812	90,511,600	514,345,000
1936-1940	92,862	116,512,300	726,544,000
1941-1945	107,547	172,510,200	1,228,652,000
1946-1947*	120,600	250,539,300	2,027,352,000
	Leather and Rubber Goods		
1916-1920	39,506	$36,307,940	$269,801,000
1921-1925	34,203	39,235,300	198,279,000
1926-1930	31,838	39,169,900	200,949,000
1931-1935	29,009	27,626,900	117,076,000
1936-1940	34,784	36,537,900	166,843,000
1941-1945	39,546	64,613,100	306,129,000
1946-1947*	44,774	93,716,600	418,280,000
	Lumber and Its Re-manufacture		
1916-1920	35,783	$33,542,300	$124,583,500
1921-1925	34,839	43,354,600	133,283,300
1926-1930	33,599	46,377,000	129,935,100
1931-1935	21,614	20,986,900	52,636,300
1936-1940	24,346	25,736,400	72,040,300
1941-1945	27,040	40,447,060	128,127,100
1946-1947*	35,153	68,127,600	202,259,000

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* Two years only.

Five-Year Averages (cont.)
1916—1947
Major Industrial Classifications

Dates	*Employes*	*Compensation*	*Value of Product*
	Metals and Metal Products		
1916-1920	554,722	$745,398,500	$4,230,830,000
1921-1925	434,496	654,924,900	3,098,696,000
1926-1930	444,123	746,220,160	3,119,364,000
1931-1935	304,752	366,220,920	1,279,869,000
1936-1940	432,783	663,039,660	2,450,624,000
1941-1945	715,504	1,747,893,560	6,196,735,000
1946-1947*	698,115	1,876,841,200	5,807,102,000
	Mine and Quarry Products		
1916-1920	327,835	$408,399,840	$722,535,000
1921-1925	352,918	500,747,000	769,024,000
1926-1930	318,395	460,412,800	705,179,000
1931-1935	235,718	242,234,120	387,886,000
1936-1940	215,492	260,265,280	418,113,000
1941-1945	188,088	406,897,280	733,481,000
1946-1947*	184,276	547,420,600	1,016,843,000
	Paper, Paper Products, and Printing Industries		
1916-1920	58,899	$63,325,780	$244,783,000
1921-1925	64,311	94,446,620	323,124,000
1926-1930	69,763	116,317,060	389,098,000
1931-1935	64,906	91,420,840	276,443,000
1936-1940	73,639	111,814,600	339,062,000
1941-1945	78,003	152,444,220	518,608,000
1946-1947*	93,777	244,813,300	809,174,000

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* Two years only.

Dates	*Employes*	*Compensation*	*Value of Product*
	Textiles and Textile Products		
1916-1920	214,403	$161,463,040	$857,617,000
1921-1925	231,483	237,502,080	1,031,557,000
1926-1930	259,638	299,003,360	1,147,985,000
1931-1935	256,055	212,874,280	667,423,000
1936-1940	272,877	243,615,840	776,700,000
1941-1945	271,835	375,653,540	1,259,602,000
1946-1947*	299,776	559,899,500	1,849,506,000
	Tobacco and Its Products		
1916-1920	33,740	$22,060,560	$84,264,000
1921-1925	37,059	27,445,260	122,441,000
1926-1930	31,527	24,726,040	113,602,000
1931-1935	22,406	13,767,320	63,844,000
1936-1940	20,350	15,024,560	85,972,000
1941-1945	18,382	21,546,820	120,483,000
1946-1947*	20,956	31,596,100	155,346,000

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* Two years only.

Five-Year Averages (cont.)
1916—1947
Major Industrial Classifications

Dates	*Employes*	*Compensation*	*Value of Product*
	Railroad Repair Shops		
1916-1920	.....	....	$172,904,000
1921-1925	71,413	$113,722,740	214,215,000
1926-1930	62,851	102,579,920	183,123,000
1931-1935	44,395	53,964,740	93,061,000
1936-1940	40,112	64,986,000	124,171,000
1941-1945	53,946	123,124,040	208,805,000
1946-1947*	50,861	148,931,000	222,199,000
	Miscellaneous Products †		
1916-1920	88,898	$106,534,180	$381,599,600
1921-1925	64,499	80,273,700	293,970,560
1926-1930	60,754	79,958,440	271,790,980
1931-1935	50,261	52,362,320	157,627,700
1936-1940	64,703	77,983,340	245,505,980
1941-1945	155,082	363,494,400	941,007,320
1946-1947*	93,510	200,013,800	611,535,000

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* Two years only.

† "Miscellaneous Products" includes such diverse products as coke, dental supplies, and shipbuilding.

Industrial Data from Pa. Dept. of Internal Affairs.

Pennsylvania
Manufacturing and Extractive Industries
Average Annual Operating Ratios

Year	*Employes Per Establishment*	*Compensation Per Employe**	*Value of Product Per $1.00 Compensation*
1926	89	1,482	3.54
1927	76	1,460	3.41
1928	77	1,467	3.52
1929	79	1,506	3.61
1930	69	1,400	3.38
1931	64	1,215	3.11
1932	58	974	3.02
1933	61	927	3.29
1934	67	1,069	3.24
1935	70	1,125	3.34
1936	76	1,228	3.61
1937	81	1,330	3.57
1938	72	1,184	3.27
1939	77	1,287	3.58
1940	82	1,367	3.51
1941	95	1,617	3.58
1942	102	1,930	3.53
1943	108	2,201	3.47
1944	100	2,380	3.48
1945	91	2,286	3.32
1946	90	2,270	3.26
1947	92	2,634	3.50

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* Includes part-time employes.

Old Main at Pennsylvania State College.

A Typical Pennsylvania Farm

Agriculture

Though Pennsylvania is in many respects the greatest industrial State in our Nation and the unquestionable leader in the production of raw materials, the State's farms continue to play a vital part in providing a solid background for its prosperity.

The value of Pennsylvania's farm land and buildings reported in 1945 by the United States Census of Agriculture was $1,008,573,540, an increase of 16.7 percent since 1940. The average value per farm was $5,872 or $67.15 per acre for the 15,019,675 acres included in the State's agricultural land. This value per acre compares with $59 in 1940 and $54 in 1935. It was well below the $78.50 per acre recorded in 1930, the highest value ever reached in the history of the State's agriculture.

Heavy industrial concentration such as that produced by a great war or a period of unusual prosperity generally leads to a decline in the number of farms and the number of persons on farms. There were nearly 20,000 fewer farms in 1945 than there were in 1935 in the valley of the great depression. There has, in fact, been a general tendency since 1900 for the number of farms to decline, although the average acreage per farm has shown little change in the past 65 years. The figure of 87.4 acres per farm for 1945 can be compared with 87.3 acres in 1920, and 86.8 in 1890. The over-all decline of the land in farms is undoubtedly due to the fact that many submarginal farms have been returned to forest growth during the past 45 years, and that there has been a gradual increase of urban and industrial developments in agricultural areas.

Of Pennsylvania's 171,761 farms, the largest number fell within the group containing 100 to 135 acres; 3,058 farms were less than 3 acres in size; 140 were 1,000 to 5,000 acres; and 6 Pennsylvania farms were from 5,000 to 10,000 acres.

The importance of livestock and dairying on the Pennsylvania farm illustrated by the splendid showing of dairy cattle at the State Farm Show each year is also evidenced by the gradual growth in the number of our cows and heifers, which in 1945 had reached a higher point than in any previous Census with a total of 1,011,853. It is interesting to note that of all the Northeastern states only Pennsylvania and Vermont show an increase in dairy cattle over the last 45 years.

One striking evidence of the prosperity of the Pennsylvania farm is the fact that of all the Middle Atlantic and New England states Pennsylvania has the largest number of farm dwellings with electricity, and with radios, and that it has the largest number with both electricity and running water of any states but Texas and California.

Pennsylvania's total of $836,507,000 in 1948 is the highest cash farm income ever recorded in the history of the State. How great the increase in rural prosperity has been in the past fifteen years can best be realized by comparing this figure of nearly $840,000,000 for 1948, with the $158,590,000 farm income sixteen years ago in 1932. The value of agricultural production in 1948 is more than five times as great as it was a decade and a half ago.

The State's 1948 income for livestock and livestock products was $616,481,000, while crops sold for $220,026,000.

The State leads the Nation in milk sold on the farm, in cigar leaf tobacco, and buckwheat, produces more turkeys than any other state east of the Mississippi, and because of the variety of its production has developed many industries of national importance based on the processing of food. In the city of Pittsburgh is the largest food-packing plant in the Nation and perhaps in the World; in Adams County, the largest apple-processing plant; and in Erie County, the largest grapejuice plant. The State has for many years been first in the production of ice cream, cream cheese, scrapple, and pork sausage.

In the production of mushrooms, one section of Chester County produces 65 percent of the entire United States marketings and is well called the "mushroom center" of the World.

The important fruit crops of apples, peaches, pears, cherries and grapes figure large in the agricultural economy of several of our rural counties.

Lancaster County, Pennsylvania, is first among the 3,069 counties in the United States in the production of tobacco. It is second in the United States in the number of dozens of eggs produced. York County is fourth, Bucks County is thirteenth, and eight other Pennsylvania counties are among the first hundred.

Lancaster County is third in the number of chickens on farms. York County is fourth. Bucks County is eighth, and seven other Pennsylvania counties are among the first hundred. Lancaster County is ninth in the value of all dairy products sold, and six other Pennsylvania counties are among the Nation's leaders.

Only nine counties in the United States exceed Adams County in the number of apple or cherry trees on its farms. Eleven Pennsylvania counties are among the first hundred in the annual harvest of Irish potatoes, and in the number of apple and cherry trees. Erie is the fourteenth county in the United States in the number of grapevines, and Allegheny County, with all of its heavy industrial activity, is among the first hundred counties in the United States in its harvest of cherries, pears, plums, grapes and apples.

Pennsylvania

Agriculture

Production and Yield—Five-Year Averages

	Corn		*Wheat*		*Oats*	
	Production *(Bushels)*	*Yield Per Acre*	*Production* *(Bushels)*	*Yield Per Acre*	*Production* *(Bushels)*	*Yield Per Acre*
1866-1870	40,409,000	33.9	16,926,000	12.6	31,567,000	29.4
1871-1875	45,422,000	35.5	19,670,000	13.8	28,798,000	25.4
1876-1880	45,097,000	33.3	20,616,000	14.3	35,504,000	28.3
1881-1885	43,180,000	30.9	22,141,000	14.8	34,908,000	27.8
1886-1890	47,548,000	33.8	20,947,000	15.1	33,709,000	25.6
1891-1895	46,018,000	32.5	22,481,000	17.1	32,722,000	26.9
1896-1900	54,302,000	36.0	20,835,000	14.7	33,302,000	28.0
1901-1905	54,933,000	36.1	23,305,000	15.6	34,119,000	28.8
1906-1910	52,662,000	36.4	23,196,000	17.6	32,546,000	28.3
1911-1915	58,651,000	40.1	19,817,000	16.5	34,691,000	31.0
1916-1920	63,742,000	41.4	21,985,000	16.7	37,997,000	32.6
1921-1925	60,071,000	43.8	21,142,000	17.7	31,648,000	29.1
1926-1930	44,871,000	35.8	18,771,000	18.2	30,171,000	30.7
1931-1935	54,600,000	41.0	17,551,000	18.5	25,009,000	26.7
1936-1940	54,960,000	41.1	20,063,000	20.5	26,123,000	30.1
1941-1945	52,988,000	40.0	17,011,000	19.7	24,034,000	28.7
1946-1948*	60,726,000	44.0	12,112,000	21.8	26,348,000	34.2

	Potatoes		*Tobacco*		*Hay*	
	Production *(Bushels)*	*Yield Per Acre*	*Production* *(Pounds)*	*Yield Per Acre*	*Production* *(Tons)*	*Yield Per Acre*
1866-1870	10,299,000	87.0	3,926,000	1,154	2,508,000	1.22
1871-1875	12,261,000	89.0	11,176,000	1,108	2,380,000	1.11
1876-1880	13,581,000	80.0	28,814,000	1,172	3,024,000	1.20
1881-1885	16,515,000	85.0	27,576,000	971	3,512,000	1.23
1886-1890	16,296,000	83.0	29,470,000	1,069	3,744,000	1.23
1891-1895	18,152,000	90.0	30,896,000	1,147	3,512,000	1.23
1896-1900	18,254,000	83.0	35,656,000	1,319	3,821,000	1.22
1901-1905	20,910,000	89.0	33,983,000	1,502	3,875,000	1.25
1906-1910	22,451,000	88.0	54,450,000	1,408	3,848,000	1.27
1911-1915	24,035,000	90.0	54,906,000	1,381	3,734,000	1.24
1916-1920	23,932,000	91.0	60,736,000	1,409	3,859,000	1.31
1921-1925	21,878,000	102.0	57,168,000	1,320	3,687,000	1.22
1926-1930	22,735,000	109.0	47,099,000	1,255	3,392,000	1.26
1931-1935	26,497,000	122.0	35,611,000	1,238	2,946,000	1.21
1936-1940	21,525,000	120.0	41,704,000	1,454	3,056,000	1.30
1941-1945	18,843,000	120.0	47,949,000	1,400	3,548,000	1.43
1946-1948*	19,159,000	169.0	36,229,000	1,570	3,628,000	1.49

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* Three-year average.

Pennsylvania

Agriculture

Five-Year Average—Livestock on Farms**

	Horses and Mules	*Hogs*	*Cattle Including Milk Cows*	*Milk Cows Only*	*Sheep*
1867-1870* . . .	486,500	1,011,500	1,539,500	688,000	2,444,000
1871-1875	526,000	1,071,600	1,695,800	763,000	1,676,200
1876-1880	562,400	1,039,800	1,877,400	813,600	1,661,000
1881-1885	588,400	1,215,800	1,901,000	872,000	2,137,000
1886-1890	618,200	1,145,000	1,922,600	890,400	1,818,000
1891-1895	627,400	1,088,000	1,890,600	913,400	1,632,000
1896-1900	636,600	992,800	1,691,800	932,600	1,057,600
1901-1905	604,400	908,000	1,565,000	947,600	842,800
1906-1910	593,600	818,000	1,481,600	938,200	704,200
1911-1915	591,400	891,000	1,389,400	925,000	586,000
1916-1920	580,000	1,135,200	1,491,800	923,600	489,400
1921-1925	507,600	978,800	1,425,000	901,000	448,200
1926-1930	403,200	738,200	1,301,400	827,600	432,000
1931-1935	351,800	636,600	1,415,200	884,600	474,200
1940†	299,767	515,269	1,333,896	866,936	334,661
1945†	229,202	767,027	1,685,238	1,011,853	278,882

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* Four-year average.

† One year only—United States Census.

1948 Production and Value of Specified Crops**

	Production		*Value*	
Crop and Unit	*Amount*	*U.S. Rank*	*Amount*	*U.S. Rank*
Corn, bu.	65,379,000	15	$111,144,000	12
Wheat, bu.	18,354,000	18	39,461,000	18
Oats, bu.	29,146,000	12	26,231,000	12
Barley, bu.	3,933,000	17	5,506,000	15
Rye, bu.	232,000	24	394,000	23
Buckwheat, bu.	2,332,000	1	2,915,000	1
Soybeans, bu.	256,000	21	627,000	22
All Hay, tons	3,430,000	13	66,885,000	10
Cigar Leaf Tobacco, lbs. . .	63,505,000	1	19,444,000	2
Potatoes, bu.	19,425,000	7	32,051,000	6
Commercial Truck Crops . .	. . . .	.	17,785,000	10
Commercial Apples, bu. . . .	4,520,000	6	9,040,000	4
Peaches, bu.	2,182,000	7	5,019,000	6
Maple Sugar, lbs.	15,000	3	10,000	4
Maple Syrup, gal.	61,000	5	271,000	5

** Pennsylvania Department of Agriculture.

Pennsylvania

Agriculture

Livestock and Poultry on Farms, January 1, 1949*

	Number	*Value*	*Farm Value Per Head*
Cattle	1,755,000	$310,635,000	$177.00
Milk Cows	1,000,000	233,000,000	233.00
Hogs	718,000	25,345,000	35.30
Sheep	228,000	3,420,000	15.00
Horses and Mules	144,000	10,592,000	73.60
Chickens	24,100,000	50,128,000	2.08
Turkeys	166,000	1,444,000	8.70
Aggregate Value of Cattle, Hogs, Sheep, Horses, Mules, Chickens, and Turkeys		$401,564,000	

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* Pennsylvania Department of Agriculture.

Number, Averages, Size, Value, and Tenure of Farms (1945 U. S. Census of Agriculture)

Number of Farms	171,761
Total Farm Acreage	15,019,675
Percent of State Area	51.8%
Average Acreage Per Farm	87.4
Total Arable Acreage	8,001,335
Percent of Farm Area	53.3%
Average Arable Acreage Per Farm	48.4
Total Farm Woodland Acreage	3,312,084
Percent of Farm Area	22.1%
Percent of Farms Tenant Operated	12.9%
Rural Farm Population, 1945	749,030
Total Value of Land and Buildings	$1,008,573,540
Average Per Farm Reporting	$5,872
Average Value Per Acre	$67.15
Approximate Value of Products Sold	$456,146,673
Average Value Per Farm Reporting	$2,712

Farm Facilities

(1945 U. S. Census of Agriculture)

		*Percent of All Farms**
Automobiles	165,168	79.5
Trucks	56,271	28.0
Tractors	92,638	47.0
(U. S. Crop Reporting Service—1948)		
Electric Refrigerators	84,772	49.4
Electric Ranges	31,488	18.3
Telephones	69,445	40.4
Radios	157,000	91.4
Electrified Farms	148,900	86.7
Farm Power Units	414,495	2.4†

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* Percentage of total number of farms as reported by 1945 Census of Agriculture.

† Average units per farm.

Income and Finance

The United States Department of Commerce estimates that 1947 total income payments in Pennsylvania amounted to $14,426,000,000. This is, of course, the highest recorded income during the State's history, and represents an increase of 97 percent over 1929, and a rise of nearly $10,400,000,000 over the low point of 1933.

Changes in recent years, indicated in one of the following tables, are particularly marked by a decline in the percentage of property income to the total, by the relative stability of wages and salaries as a proportion of the total, and by a marked increase in proprietors' income, which includes that of farm owners, and in "all other income" which includes pensions, military allowances, and all other forms of Government payments.

Pennsylvania's per capita income is higher than the National average, but, because of our relatively large rural population and the high percentage of women employes in our important textile industries, is lower than that of several Eastern industrial states. It has, however, shown a notable rise during the past ten years.

The listed bank deposits, totalling $10,756,000,000 as of June 30, 1948, do not include deposits in postal savings banks, or in building and loan associations.

Because of the rise in industrial activity in the South and West during recent years, and the general industrial development of the United States, Pennsylvania's percentage of the total National income has declined as has that of Massachusetts, New Jersey, New York, Illinois, and all of our earlier settled states.

Income estimates for 1947 showed, however, that Pennsylvania's percentage of the National income had reversed this long-term downward trend. The State's income credited to wages and salaries in manufactures between 1946 and 1947 showed the highest percentage rise among the twelve New England and Middle Atlantic states.

Pennsylvania

Finance

Banking

Total Banking Institutions, December 31, 1948	993
National	637
State	356
Banks	156
Bank and Trust Companies	178
Trust Companies	2
Savings Banks	8
Private Banks	12
Building and Loan Companies, January 31, 1949	786
Small Loan Companies	565
Credit Unions	91
Consumer Discount Companies	404
Licensed Pawnbrokers	92
Total Bank Deposits, June 30, 1948	$10,756,015,222
State Banks	$4,378,107,225
National Banks	$6,377,908,000

Insurance

January 17, 1949

Total Foreign Insurance Corporations Registered in Pennsylvania	1,016
Domestic Insurance Corporations, Companies and Fraternal	426
Life	14
Limited Life	7
Beneficial Associations	17
Assessment Associations	1
Fire—Stock	27
Fire—Mutual	240
Wind and Storm Mutual	4
Liability and Casualty	
Stock Casualty	12
Mutual Casualty	19
Title Insurance	31
Reciprocal (All Forms but Life)	2
Fraternal Beneficial	45
Non-Profit Hospitalization	6
Non-Profit Medical	1

Pennsylvania

Income

Estimated Income Payments*

	Total	*Per Capita*
1929	$7,338,000	$767
1930	6,638,000	688
1931	5,580,000	576
1932	4,172,000	429
1933	4,027,000	414
1934	4,627,000	474
1935	4,989,000	510
1936	5,818,000	594
1937	6,174,000	629
1938	5,438,000	553
1939	5,819,000	589
1940	6,225,000	628
1941	7,404,000	750
1942	8,847,000	907
1943	10,270,000	1,079
1944	11,085,000	1,181
1945	11,376,000	1,213
1946	12,712,000	1,244
1947	14,426,000	1,372

Source: United States Department of Commerce.

By Type of Payment

(Amounts in Millions)

	Wages and Salaries		*Proprietors' Income*		*Property Income*		*Other Income*		
	Amount	*Percent of Total*	*Amount*	*Percent of Total*	*Amount*	*Percent of Total*	*Amount*	*Percent of Total*	*Total*
929	$4,987	67.96	$808	11.01	$1,452	19.79	$91	1.24	$7,338
933	2,594	64.42	404	9.93	831	20.64	202	5.02	4,027
939	3,760	64.62	627	10.77	979	16.82	453	7.79	5,819
940	4,148	66.63	692	11.12	978	15.71	407	6.54	6,225
941	5,201	70.25	853	11.52	1,014	13.69	336	4.54	7,404
1942	6,422	72.59	1,054	11.91	1,068	12.07	303	3.43	8,847
1943	7,501	73.04	1,239	12.06	1,117	10.88	413	4.02	10,270
1944	7,870	71.00	1,362	12.29	1,189	10.72	664	5.99	11,085
1945	7,715	67.82	1,465	12.88	1,261	11.08	935	8.22	11,376
1946	8,346	65.65	1,938	15.25	1,423	11.19	1,005	7.91	12,712
1947	9,788	67.85	2,148	14.89	1,620	11.23	870	6.03	14,426

Income estimates by U. S. Dept. Commerce.

* NOTE: These estimates exclude the pay of civilians or Armed Forces situated outside of the United States, except family allowances granted within the Country. Employes' contributions to ocial security, railroad, unemployment insurance, and Government retirement funds are deducted from the given totals.

Pennsylvania

Income

	1940	*1947*
Total Income Payments to Individuals	$6,225,000,000	$14,426,000,000
Percent of United States Total	8.2%	7.6%
Total Wage and Salary Payments	4,148,000,000	9,788,000,000
Percent of Pennsylvania's Total	66.6%	67.8%
Total Manufacturing Wage and Salary Payments	1,940,046,000	4,703,384,000
Percent of Wage and Salary Total	46.8%	48.1%

	Increase 1940 to 1947	
	Amount	*Percent*
Total Income Payments to Individuals	$8,201,000,000	132
Total Wage and Salary Payments	5,640,000,000	136
Total Manufacturing and Extractive Wage and Salary Payments	2,763,338,000	142

Per Capita Income and Average Compensation Per Employe in Manufacturing and Extractive Industries

	1940	*1947*	*Percent of Increase*
Per Capita Income (Total Income)	$628	$1,372	118
Average Compensation Per Employe in Manufacturing and Extractive Industries	1,367	2,643	93

United States Department of Commerce.

The Benjamin Franklin Parkway in Philadelphia.

Education, Churches, Arts

The United States Census reports a total of 101 institutions of higher learning in the State of Pennsylvania—a number not surpassed in any other state.

This includes 14 State Teachers Colleges and The Pennsylvania State College, as well as such nationally-famous institutions as the University of Pennsylvania, the first American University, founded by Benjamin Franklin in 1749, which in 1765 established the first American medical school, and the Woman's Medical College, established in 1850, which was the first woman's medical school in the World.

Important colleges and technical schools are to be found in almost every section of the Commonwealth.

The State's 9,080 public schools, employed in 1948, 59,447 supervisors and teachers, and had an average daily attendance of nearly 1,461,000 pupils.

For the 1949-1951 biennium the General Assembly appropriated a total of $292,887,680 for public education.

This includes large appropriations to assist school districts in the payment of salaries, to provide transportation for school children and to support the education of the handicapped.

The State also maintains the fourteen State Teachers Colleges, makes appropriations for buildings, maintenance and research at The Pennsylvania State College and assists in the operation of many other educational institutions. It also contributes its matching share of payments to the Teachers Retirement Fund and provides aid to free public libraries.

The tradition of religious tolerance, fundamental in the philosophy of William Penn, has led to the establishment in Pennsylvania of churches of almost every American religious denomination. The first Quaker Meeting in Pennsylvania was held in 1675—seven years before Penn's landing in Philadelphia. In 1682 the first American Mennonites settled in Germantown and spread later into Bucks, Berks, Lancaster, and Northampton Counties, establishing large communities of the Plain People.

Old Swedes' Church, Pennsylvania's earliest example of fine but simple church architecture, was completed in 1700 by a Lutheran congregation. Christ Church in Philadelphia, the present edifice of which was completed in 1754, still possesses a communion service presented by Queen Anne of England.

The Episcopalians first held services in the colony in 1695. The State's earliest Baptist Church was organized in 1684. The Presbyterians held their earliest services in 1692 and the Methodist congregations date their beginning in Pennsylvania to the efforts of a British Army Officer, a convert of John Wesley. Their first church was established in 1768.

The first Roman Catholic Parish in Pennsylvania was that of St. Joseph's in Philadelphia, established between 1731 and 1733. The present Church of St. Joseph's in Willings Alley stands on the site of the early colonial structure. In 1782 Pennsylvania's first Jewish Synagogue was dedicated.

The buildings of the Harmony Society at Ambridge, north of Pittsburgh, like those at Ephrata in Lancaster

Old Swedes' Church in Philadelphia
The oldest church edifice in the State

County, are memorials to two of the most interesting of the many religious bodies whose people sought refuge in Pennsylvania for the practice of their faiths.

Today with more than five and a half million church members and more than two million Sunday School teachers and pupils, Pennsylvania has more churches than any other State and still retains congregations of almost every one of the many sects which took shelter in this colony in those long-ago years of religious persecution.

Pennsylvania has always occupied an important place in American art, literature and invention. The first novelist of our Nation, Charles Brockden Brown, was a Pennsylvanian. Edgar Allan Poe and Walt Whitman were intimately associated with the city of Philadelphia at the height of their literary careers. The first great American painter, Benjamin West, was a Pennsylvanian. Thomas Eakins, one of America's masters, was first a student and afterwards a teacher at the Pennsylvania Academy of Fine Arts. Henry O. Tanner, the great negro painter of Biblical scenes, was a Pennsylvanian.

The annual shows at the Pennsylvania Academy of Fine Arts, the first such institution ever established in America, at the Carnegie Institute in Pittsburgh and in many other art museums of the State, are of national interest.

Other evidences of the important influence of the cultural traditions of the Commonwealth are the notable contributions made by Pennsylvania collectors to the National Gallery of Art, which was made possible by the bequest to the Nation by Andrew Mellon of the building and of his World-famous collection of masterpieces, and by the notable gifts of paintings and sculpture by two other Pennsylvanians, Samuel H. Kress and Joseph Widener.

The Pennsylvania State Capitol at Harrisburg, which with its adjoining buildings forms the most impressive group of state government structures in America, contains many examples of the work of outstanding Pennsylvania painters and sculptors.

A corner in the dormitories of the University of Pennsylvania

Flanking the main entrance to the Capitol building are two symbolic groups in white marble by one of America's leading sculptors, George Gray Barnard, a native son of Pennsylvania. Four large lunettes in the Capitol rotunda and two large symbolic paintings in the chamber of the House of Representatives were painted by Edwin Austin Abbey, another Pennsylvanian, whose "Holy Grail" series in the Boston Public Library have given him a high place among modern muralists.

Miss Violet Oakley, America's most distinguished woman mural painter, has decorated the Senate Chamber, the Supreme Court Room and the Governor's Reception Room in the Capitol. She also is a Pennsylvanian.

Among a host of recent or contemporary Pennsylvania painters, some of the best known are Edward W. Redfield, W. Elmer Schofield and Daniel Garber of the Delaware River School, John W. Alexander, Cecelia Beaux, George Biddle, Arthur Carles, William Glackens, Robert Henri, George Luks, Maxfield Parrish, Hobson Pittman, Francis Speight, Franklin Watkins and N. C. Wyeth. R. Tait McKenzie of Philadelphia, sculptor of American athletes, created many monumental war memorials.

The modern primitive school of American painting began with the landscapes of John Kane, a self-taught Irish house painter of Pittsburgh. Throughout a lifetime of hard manual work he painted, with great freshness and power, scenes of the industrial life of western Pennsylvania and in competition with the leading artists of the world gained first place at the Carnegie International Exhibition.

Among leading American illustrators Pennsylvanians also have a high place. Joseph Pennell, greatest American lithographer and etcher of industrial scenes, Thornton Oakley and George Harding, who is also a muralist, are widely known.

In a recent renaissance of American handcrafts the contribution of our early Pennsylvania-German settlers to the art traditions of America has been recognized as of first importance.

The University of Pittsburgh's Cathedral of Learning

A list of Pennsylvania's distinguished writers would be too long for this brief survey but should at least include Louisa M. Alcott, the author of "Little Men" and "Little Women," who was born in Germantown; Bayard Taylor; Dr. S. Weir Mitchell, a great neurologist, who wrote one of America's outstanding historical novels, "Hugh Wynne, Free Quaker"; John Luther Long, the author of "Madame Butterfly"; Agnes Repplier; Owen Wister, whose "Virginian" began a new type of Western novel; Joseph Hergesheimer; Willa Cather; John T. McIntyre; Christopher Morley; and Stephen Vincent Benet, a native of Bethlehem, whose "John Brown's Body" was a distinguished achievement in narrative poetry.

Among the State's better known composers are Ethelbert Nevin, Charles Wakefield Cadman and Henry Thacker Burleigh. Stephen Collins Foster of Pittsburgh is America's greatest song writer.

The Philadelphia Symphony Orchestra is among the best in the world, but several other Pennsylvania cities support orchestras which have added greatly to the high place Pennsylvania has always occupied in the musical world. The annual Bach Festival held each May at Bethlehem is an event of international importance.

Pennsylvania

Education

Public Schools

School Year 1947-1948

School Buildings (1946-1947)	8,642
School Districts	2,543
Teachers and Supervising Officials	59,744
Total Enrollment	1,523,267
Average Daily Membership	1,460,823

School Year 1946-1947

Total Current Expenses	$210,896,885
Current Expense per Average Daily Membership	$144.69

Other Schools and Colleges

1947

Private and Parochial Schools	1,131
Enrollment	285,997
Colleges and Universities (Including four Theological Seminaries)	76
State Teachers Colleges	14
Junior Colleges	11

Churches (1936)

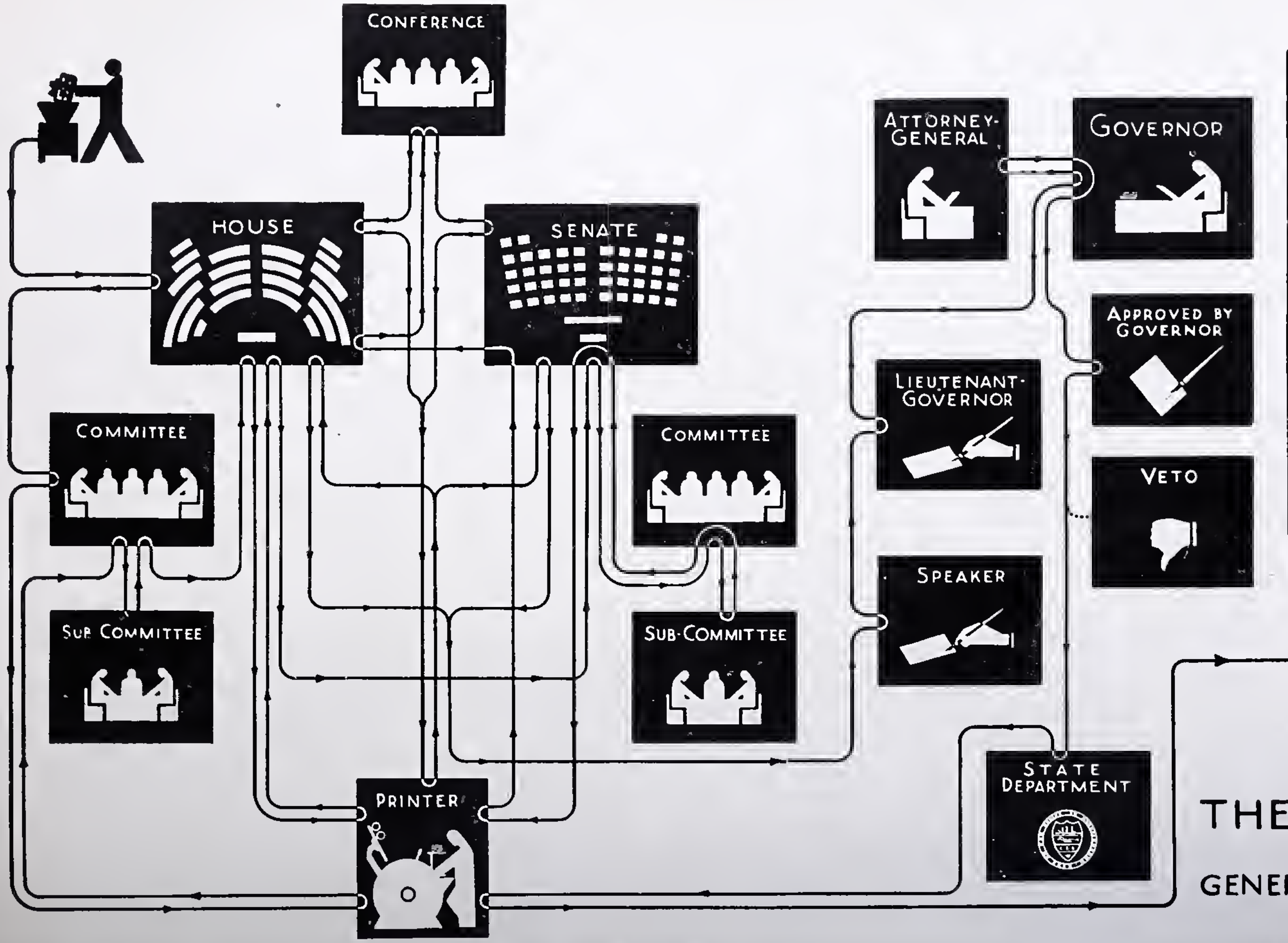
	Total	*Urban*	*Rural*
Churches	13,461	6,523	6,938
Members	5,412,246	4,275,051	1,137,195
Average Members Per Church	402	655	164

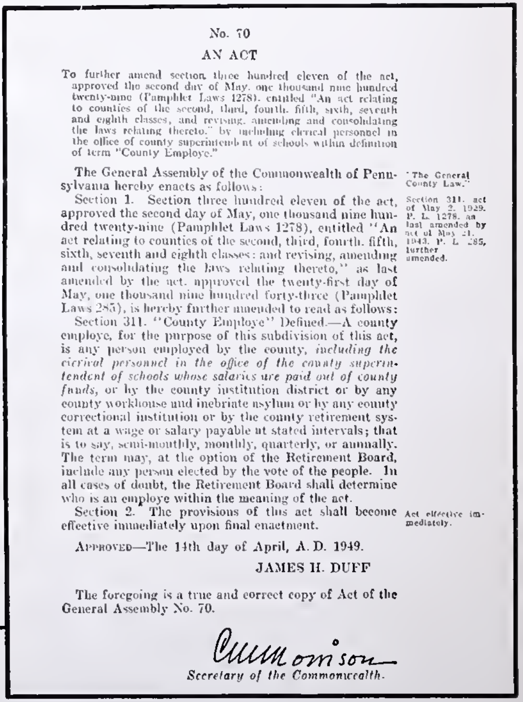
Libraries and Museums

Public Libraries	359
Museums	152

Health

Hospitals	326
Licensed Physicians	15,071
Registered Nurses	62,000
Licensed Dentists	7,187




No. 70

AN ACT

To further amend section three hundred eleven of the act, approved the second day of May, one thousand nine hundred twenty-nine (Pamphlet Laws 1278), entitled "An act relating to counties of the second, third, fourth, fifth, sixth, seventh and eighth classes, and revising, amending and consolidating the laws relating thereto," by including clerical personnel in the office of county superintendent of schools within definition of term "County Employe."

"The General County Law."

The General Assembly of the Commonwealth of Pennsylvania hereby enacts as follows:

Section 311, act of May 2, 1929, P. L. 1278, as last amended by act of May 21, 1943, P. L. 285, further amended.

Section 1. Section three hundred eleven of the act, approved the second day of May, one thousand nine hundred twenty-nine (Pamphlet Laws 1278), entitled "An act relating to counties of the second, third, fourth, fifth, sixth, seventh and eighth classes; and revising, amending and consolidating the laws relating thereto," as last amended by the act, approved the twenty-first day of May, one thousand nine hundred forty-three (Pamphlet Laws 285), is hereby further amended to read as follows:

Section 311. "County Employe" Defined.—A county employe, for the purpose of this subdivision of this act, is any person employed by the county, *including the clerical personnel in the office of the county superintendent of schools whose salaries are paid out of county funds*, or by the county institution district or by any county workhouse and inebriate asylum or by any county correctional institution or by the county retirement system at a wage or salary payable at stated intervals; that is to say, semi-monthly, monthly, quarterly, or annually. The term may, at the option of the Retirement Board, include any person elected by the vote of the people. In all cases of doubt, the Retirement Board shall determine who is an employe within the meaning of the act.

Section 2. The provisions of this act shall become effective immediately upon final enactment.

Act effective immediately.

Approved—The 14th day of April, A. D. 1949.

JAMES H. DUFF

The foregoing is a true and correct copy of Act of the General Assembly No. 70.

CMMorrison
Secretary of the Commonwealth.

THE BIOGRAPHY OF A BILL
IN THE
GENERAL ASSEMBLY OF PENNSYLVANIA

BY S. EDWARD MOORE, PARLIAMENTARIAN

PENNSYLVANIA DEPARTMENT OF COMMERCE

STATE PLANNING BOARD

An opening meeting of the General Assembly

State and Local Government

Pennsylvania's State Government operates under the Constitution adopted at an election held in 1873. This document has been frequently amended, but has remained in effect longer than any other constitution ever adopted by the Commonwealth.

In the American form of government, all power originally stemmed from the thirteen states which formed the Federal Union. Those states granted to the United States Government all the basic powers which it now possesses, but reserved to themselves, and to the people, all other governmental powers.

In Pennsylvania the power of self-government is granted to counties, cities, and other civil subdivisions only through the State, but amendments to the State Constitution must always be ratified by the people at a general election.

Constitutional Requirements for Public Office

Certain qualifications are required by the Constitutions of the United States and the Commonwealth of Pennsylvania for many of the more important public offices. Since the several political parties make certain their candidates qualify for these offices before nomination, relatively few persons are familiar with the mandatory requirements.

The Governor and Lieutenant Governor of our State must be at least thirty years of age. They must have been inhabitants of the State for at least seven years immediately preceding their election, unless they had been absent during that time on public business of the Federal or State Governments, and they must be citizens of the United States. Their term of office is four years and they are not eligible to the office for the next succeeding term. Including Pennsylvania, twenty-five states now have four-year terms for their Governors, and twenty-three have two-year terms.

The Senators elected to Congress must be at least thirty years of age, nine years citizens of the United States, and inhabitants of the state in which they were chosen. Their term of office is six years. United States Representatives must be twenty-five years of age, have been citizens of the United States for seven years and also inhabitants of the states in which they were chosen. Their term of office is two years.

Senators elected to the State Legislature are required to be at least twenty-five years of age. Representatives must be at least twenty-one. They must have been citizens and inhabitants of the State four years, and inhabitants of their respective districts one year immediately preceding their election unless absent on public business of the United States or the Commonwealth. The term of office for a State Senator is four years and for a State Representative two years.

The Duties of the Governor

The Governor of Pennsylvania has extremely heavy responsibilities. At each regular meeting of the General

Assembly the Governor must submit a State Budget recommending amounts to be appropriated for each of the State agencies and for all other special purposes. He must also submit estimates of receipts from all sources and the amount necessary to be raised by taxation. Once appropriations have been made, the Governor, through his Budget Bureau, exercises a close month by month control over expenditures. The Governor also must approve or disapprove all proposed investments of State custodial funds.

Apart from these financial powers which are of first importance to the economic stability of the State Government, the Governor, under the Constitution, has the power to appoint, with the approval of two-thirds of the Senate, all administrative officers of the Commonwealth, to fill vacancies in the judiciary or other offices, to grant reprieves and pardons, except in cases of impeachment, to convene the General Assembly for emergency action, to adjourn the General Assembly if the two Houses disagree as to the time of adjournment, to approve or veto legislation passed by the Assembly, to disapprove or reduce items of any appropriation bill, and to act as Commander-in-Chief of the State's armed forces.

The Governor grants licenses to notaries public and issues charters for credit unions, cooperative associations and insurance companies.

In addition to these many duties the Governor is also required, under the Constitution, to give to the General Assembly on its meeting a report as to the state of the Commonwealth and to recommend needed legislation.

Departments, Boards, and Commissions in the State Government

Besides the Governor and the Lieutenant Governor who is the President of the State Senate, twenty executive departments and many boards and commissions are required to carry out the complex duties of maintaining the general welfare and protecting the citizens of our Commonwealth.

Three of the heads of executive departments are elected by popular vote. The Auditor General and the State Treasurer are elected in the years of the General Presidential Election. The Secretary of Internal Affairs, like the Governor and the Lieutenant Governor, is elected in the intervening even-numbered years. Neither the Auditor General nor the State Treasurer can succeed himself in office.

Other departments of the State Government, each headed by a secretary, with the exception of the ones noted below, are those dealing with Agriculture, Banking, Commerce, Forests and Waters, Health, Highways, Insurance which is headed by the Insurance Commissioner, Justice which is directed by the Attorney General, Labor and Industry, Military Affairs which is headed by the Adjutant General, Mines, Property and Supplies, Public Assistance, Public Instruction which is headed by the Superintendent of Public Instruction, Revenue, State which is headed by the Secretary of the Commonwealth, and Welfare.

In addition to these twenty departments there have been established the following important independent agencies: the Civil Service, Game, Historical and Museum, Milk Control, Public Utility, and Turnpike Commissions; the Pennsylvania Fish Commission; the Pennsylvania Liquor Control Board; the Board of Parole; the Tax Equalization Board; and the Pennsylvania State Police.

Many other boards and commissions function within the various departments, such as the State Farm Products Show Commission and the State Soil Conservation Commission in the Department of Agriculture; the Pennsylvania Securities Commission in the Department of Banking; the State Planning Board and the Pennsylvania Aeronautics Commission in the Department of Commerce; the Water and Power Resources Board in the Department of Forests and Waters; the Sanitary Water Board in the Department of Health; the Board of Pardons in the Department of Justice; the Workmen's Compensation Board, the State Board of Vocational Education, the Pennsylvania State Employment Service, the Labor Relations Board, the

Industrial Board, and the State Workmen's Insurance Fund in the Department of Labor and Industry; the State Veterans Commission in the Department of Military Affairs; the Pennsylvania Art Commission and the Capitol Park Extension Commission in the Department of Property and Supplies; the Professional Examining Boards, the Public School Employes' Retirement Board, the State Board of Censors, the State Council of Education, and the State Library in the Department of Public Instruction; the State Athletic Commission in the Department of Revenue; the State Employes' Retirement Board in the Department of State; the Board of Finance and Revenue in the Treasury Department; and the State Council for the Blind in the Department of Welfare.

Many of these boards and commissions, whether independent or departmental are composed chiefly, or in part, of non-paid citizen members appointed by the Governor. Certain commissions have members representing both the Legislative and Executive Branches. Chief among these are The Commission on Interstate Cooperation, The Interstate Commission on the Delaware River Basin, The Ohio River Valley Commission, and The Interstate Commission on the Potomac River Basin.

The Legislative Reference Bureau, the Joint State Government Commission, and the Local Government Commission are among the agencies of the General Assembly.

In addition to these diverse and necessary fields of our government activity are various State institutions. These include the fourteen State Teachers Colleges, the State Oral School for the Deaf, the Soldiers' Orphan School, the Thaddeus Stevens Industrial School, the Penal and Correctional Institutions, the Medical and Surgical Hospitals, the Mental Hospitals, the Hospitals for the Feeble-Minded and Epileptic, the Western State Psychiatric Institute and Clinic, the Armories, the State Arsenal, the Soldiers' and Sailors' Home, the State's Laboratories, the three Tuberculosis Sanatoria, and the State Hospital for Crippled Children.

The Pennsylvania State College is the agency of the Commonwealth for carrying out the terms of the Land Grant College Act.

Various agencies of the State Government administer large areas of land totalling nearly 2,637,000 acres, or one-eleventh of the State's total area. This total does not include the military reservation acreage nor the areas occupied by the State Institutions.

The Work of the Legislature

Our present Constitution vests all law-making authority in a General Assembly consisting of two bodies—the Senate and the House of Representatives. The members of the State Senate are elected for a term of four years, the members of the House of Representatives for a term of two years as noted on page 72.

The State is divided into fifty Senatorial Districts as nearly equal in population as possible. No county is entitled to a representation exceeding one-sixth of the whole number of senators. Under this provision, Philadelphia, however great its population, can elect no more than eight senators, and that is the number now representing it at Harrisburg.

Although the members of the House are apportioned among the counties on a ratio obtained by dividing the population of the State by 200, there are now 208 representatives in the General Assembly. This arises from the fact that under the Constitution each county having less than five ratios may have one representative for every full ratio and an additional representative when the surplus exceeds one-half a ratio; and also that each county, whatever its population, shall have at least one representative. One-two-hundredth of the State's population is now approximately 50,000 people, but there are several counties in Pennsylvania with a population of less than 8,000. Consequently, a larger number than was originally contemplated now represent us in our present General Assembly.

The Lieutenant Governor of the State is the presiding officer of the Senate, but like the Vice President of the United States in the Federal Congress, has a vote only in case of a tie.

The Speaker of the House, elected by its members from among their own number, has no limitation on his right to vote.

Before a bill is introduced in either the House or the Senate, it is usually drafted into the accepted form by the Legislative Reference Bureau. If it is a House bill it is then signed by the member sponsoring the measure and filed with the Chief Clerk of the House. In the Senate the bill is presented by the senator directly to the presiding officer.

In either case, the bill is then referred by the Speaker or the President of the Senate to an appropriate committee for consideration, and is not acted upon until that committee approves or amends it and returns it to the floor.

Once every week a History is printed for both the Senate and the House, showing the action taken on every bill presented to the Assembly.

A large part of the work done by the Legislators is that of serving on the many committees which determine the advisability of recommending for legislative action the more than 2,000 bills presented to the General Assembly during each biennial session.

The Higher Courts

Pennsylvania has two higher judicial bodies, the Supreme Court and the Superior Court. The members of the Supreme Court are called Justices, with one of their number designated as the Chief Justice. The members of the Superior Court are called Judges, headed by a President Judge.

The Supreme Court was originally created by the Provincial Assembly on May 22, 1772, long before the adoption of our present State Constitution. At that time it was provided that the Court should consist of one Chief Justice and two Associate Justices. In the following years until 1876, the number of Justices, as provided by law, varied from three to five. Since 1876, however, the number has remained at seven. At first, the Justices were generally appointed by the President of the Provincial Council and their terms of office varied from a few years to life. In 1850, by Constitutional Amendment, their offices were made elective and in 1876, their term was fixed at 21 years, with the provision that they are not eligible for re-election. This term of office and manner of selection has prevailed ever since.

The Superior Court, which is also composed of seven members, was not provided for by the Constitution. It was created in 1895 by the General Assembly because it was becoming difficult for the Supreme Court to handle the increasing volume of legal business. The Judges of this body are elected for a term of 10 years and may seek re-election.

The Supreme Court is the final tribunal to which an appeal may be made in civil cases when the amount in controversy exceeds $2500 and also in cases of felonious homicide. The Superior Court has final jurisdiction in civil cases in which the amount involved does not exceed $2500 and also in all criminal cases except felonious homicide. The Superior Court hears appeals involving the Public Utility Commission and Workmen's Compensation cases.

Local Government

Since under the State Constitution the passage of local or special laws by the General Assembly is forbidden, it has been necessary to divide the counties of the State into eight classes on the basis of population, and to create four classes of cities.

Philadelphia is the only first class county since that class is limited to those having a population of over 1,500,000. The eighth class counties are those having a population of less than 20,000 inhabitants. Each of our State's sixty-seven counties is governed by a board of three county commissioners.

There is one first class city (Philadelphia), one second class city (Pittsburgh), and one second class A city (Scranton). All other cities are listed in the third class, although their populations vary from 116,955 in 1940 for Erie to 6,935 in the same year for Corry.

All cities are governed by a mayor and a city council.

Several of the boroughs are larger than most of our third class cities. The largest borough is Norristown with a population of 38,181. The smallest borough at the time of the last Census was Mount Gretna with a population of 42.

Boroughs are governed by a burgess and a borough council.

There are two types of townships—those of the first class, governed by township commissioners, of which Upper Darby (56,883) is the most populous, and those of the second class, governed by township supervisors. The largest of these is Hempfield Township with a population of 20,687; the smallest is Barclay in Bradford County with a population of 26 (1940).

In addition, there is one community in the Commonwealth officially known as a town. That is Bloomsburg, the population of which in 1940 was 9,799.

The government of Bloomsburg is similar to that of the boroughs, but the president of the council performs most of the functions of a burgess.

The second class townships have the most limited governmental powers. They are usually in rural areas and much of the authority over their territory is exercised by their county commissioners.

There is one Indian reservation, the Cornplanter State Indian Reservation, in Warren County, with a population of 36.

Pennsylvania

State Government Personnel and Civil Subdivisions

Executive

Elected	*Term*
Governor	4 years
Lieutenant Governor	4 years
Auditor General	4 years
State Treasurer	4 years
Secretary of Internal Affairs	4 years

Appointed	*Number*
Department Secretaries, Board Directors, and Commission Chairmen	38
Permanent State Employes—April, 1948	41,000
Total State Employes, Including State Teachers Colleges and The Pennsylvania State College—1948	62,800

Legislative

State Senators	50
State Representatives	208

The Legislature convenes the first Tuesday of January in the odd numbered years.

Judiciary

Supreme Court	
Chief Justice	1
Associate Justices	6
Prothonotaries (Serve both Supreme and Superior Courts)	3
Deputy Prothonotaries (Serve both Supreme and Superior Courts)	3
State Reporters	2

Superior Court	
President Judge	1
Judges	6

Civil Subdivisions

Counties	67
Cities	50
Boroughs	942
Town	1
First Class Townships	61
Second Class Townships	1,513
School Districts	2,543
Post Offices	2,407

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

*1—Preliminary Report. 682 pages. 152 charts, December, 1934.
*10—Drainage Basin Study. 3 vols., 611 pages, 1937.
15—Recent Industrial Trends and New Employment Opportunities in Pennsylvania.
16—Retail Trade in Pennsylvania, 1946.
17—Industrial Utility of Water in Pennsylvania. Chemical Character of Surface Water, 1944 to 1946. 1947.
18—The Pennsylvania Zoning Primer (Revised), 1948.
19—Local Powers for Community Development, 1948.
20—A Pennsylvania Recreation Manual, 1949.
21—Planning and Zoning Powers and Procedures in Pennsylvania, 1949. Vol. 1. (Townships of the Second Class, Counties, Regions.)
22—Planning and Zoning Powers and Procedures in Pennsylvania, 1949. Vol. 2. (Cities, Boroughs, First Class Townships.)

These publications may be seen in representative public libraries. A limited number of those listed are available for distribution until the present supply is exhausted. Those marked with an asterisk are now out of print but may be seen in representative public libraries.

The following issues of **Pennsylvania Planning** are still available.

Local Tax Rates, May-June, 1940.
Community Self-Appraisal (Revised Edition), April, 1942.
Comparative County Data, May, 1942.
Planning and Zoning Progress in Pennsylvania, July, 1942.
Population, October, 1942.
Handicrafts in Post-War Planning, May, 1943.
Plastics, July, 1943.
Air Photographs, February, 1944.
Light Metals and Stainless Steel, August, 1944.
Topographic Mapping Needs, February, 1945. (For limited technical distribution.)
Community Action for Local Self Development, July, 1945.
Conservation, August, 1945.
Forest Resources, November, 1946.
Soil Conservation, September, 1947.
Minerals Conservation, December, 1948.

Pennsylvania State Library
DOCUMENTS SECTION

COMPARATIVE COUNTY DATA

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF COMMERCE
STATE PLANNING BOARD

Pennsylvania Planning · August, 1950

COMMONWEALTH OF PENNSYLVANIA

James H. Duff, Governor

◆

PENNSYLVANIA DEPARTMENT OF COMMERCE

Theodore Roosevelt, III, Secretary
Raymond H. Smith, Deputy Secretary

◆

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Kenneth Zeitz
Mary L. Moody

Comparative County Data

State Planning Board
Pennsylvania Department of Commerce
Harrisburg, 1950

This number of PENNSYLVANIA PLANNING *is the third devoted to providing information on a county basis as to population, industrial activity, finance, agriculture and land use.*

Since the publication of the issue of May, 1942, extraordinary and unpredictable events have greatly accelerated the State's industrial progress and the growth of its population. When such periods of high industrial activity are accompanied by a marked increase in the number of marriages and births, serious housing, traffic and land use problems are bound to develop in many of our more congested communities and the necessity for local planning and zoning and for local industrial and recreational development is forced upon the attention of our counties and municipalities.

A recent publication of the State Planning Board, "Local Powers for Community Development," provides information as to the legal authority under which communities may undertake programs of public improvement. This issue of Pennsylvania Planning is designed to provide statistical information by which the basic weakness or strength of a community's county environment may be studied in comparison with all the other regions of this State.

Data used were supplied by the Pennsylvania Departments of Internal Affairs, Health, Forests and Waters, Highways, Revenue, Public Instruction, Public Assistance, the State Tax Equalization Board, the Federal Reserve Bank, U. S. Census and the U. S. Bureau of Old Age and Survivors Insurance.

Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by
PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

Vol. 10 AUGUST, 1950 No. 5

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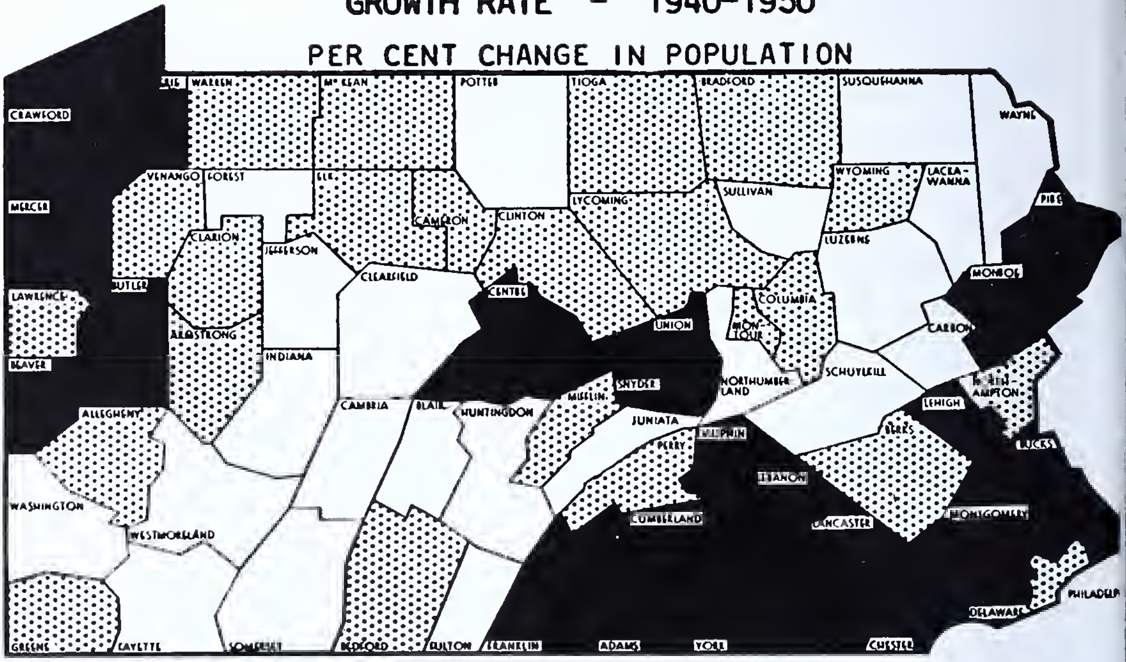
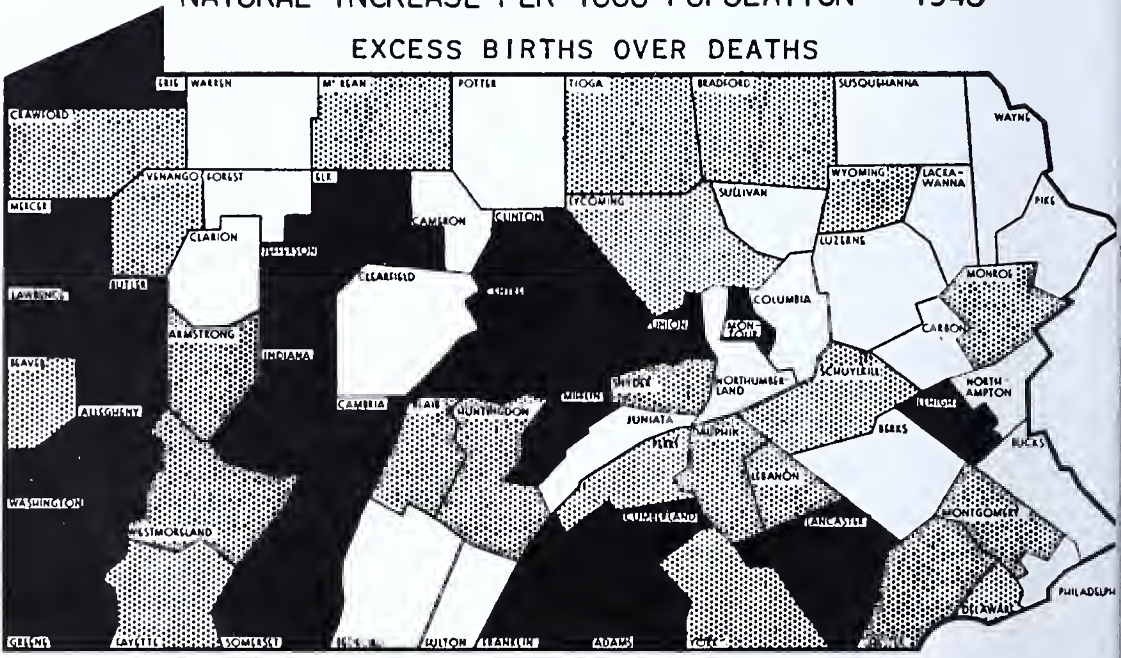
GROWTH RATE - 1940-1950

PER CENT CHANGE IN POPULATION



NATURAL INCREASE PER 1000 POPULATION - 1948

EXCESS BIRTHS OVER DEATHS



BLACK - 22 HIGHEST RANKING COUNTIES
GREY - 23 MIDDLE RANKING COUNTIES
WHITE - 22 LOWEST RANKING COUNTIES

Comparative County Data

In the following tables, which are based on the latest data available at the time of publication, all statistics which are capable of such treatment are accompanied by a statement of the rank order of each county. This will enable readers to determine at once the comparative position which their county unit bears among the sixty-seven major civil divisions of the State.

POPULATION—AND VITAL STATISTICS *(Table 1)*

The preliminary findings of the 1950 census give Pennsylvania a population of 10,435,965, an increase of 5.4 percent over 1940. This increase may be compared with a growth of 2.8 percent in the preceding decade. The population density of the State, which was 219.8 per square mile in 1940, is now 230.

As to Pennsylvania's total population and its rank among the states, whether second or third, it must be remembered that members of the armed forces are enumerated at the place where they happen to be stationed at the time of the taking of the census. Since Pennsylvania has an unusually high percentage of men in military service and no extensive peacetime military encampments its total population is likely to appear unduly low in comparison with states where large army or naval training centers are located.

As will be seen from the map on page 4, the growth-rate pattern of Pennsylvania over the past decade exhibits several definite and interesting characteristics.

The large expansion of manufacturing and commercial activities during both war and postwar years has led to a high relative growth in three areas of the State. The first and largest of these areas is to the southeast, down the Delaware River to the southern border of Pennsylvania and west to Franklin County, including Pike, Monroe, Lehigh, Bucks, Montgomery, Delaware, Chester, Lancaster, Lebanon, Dauphin, York, Cumberland, Adams and Franklin, which are all among the top third of Pennsylvania counties in population growth-rate during the decade. In the center of the State, Centre, Union and Snyder Counties, show a considerable expansion percentagewise, as do the northwestern counties of Erie, Crawford, Mercer, Butler and Beaver. All the counties named above exhibited a growth-rate of more than 9½ percent.

While Philadelphia and Allegheny Counties, the two most populous in the State, are not to be found among those with the highest growth rate, each of those counties increased in population at a rate considerably greater than that of the State as a whole. Between 1930 and 1940, Allegheny County had gained only 37,000. The indicated increase between 1940 and 1950 of 96,719 is nearly three times as great. Between 1930 and 1940, Philadelphia had lost 19,627 inhabitants, and its population appeared to have passed its peak. In the 1940-1950 decade, however, this trend was reversed. Since 1940 the city has registered a gain of 125,876.

Two counties adjacent to Philadelphia, Bucks and Delaware, added approximately 33 percent to their population during the past ten years. The Erie industrial area grew more than 20 percent. Rural counties containing colleges or other institutions with large enrollments showed unusual growth. Population losses were general throughout the anthracite area and in the bituminous coal regions, due in part to increased efficiency in the use of coal and to the competition of fuel oil. During the ten-year period, while the State was increasing in numbers by approximately 536,000, twenty-nine counties lost population, largely through migration to the State's larger centers of commercial and manufacturing employment.

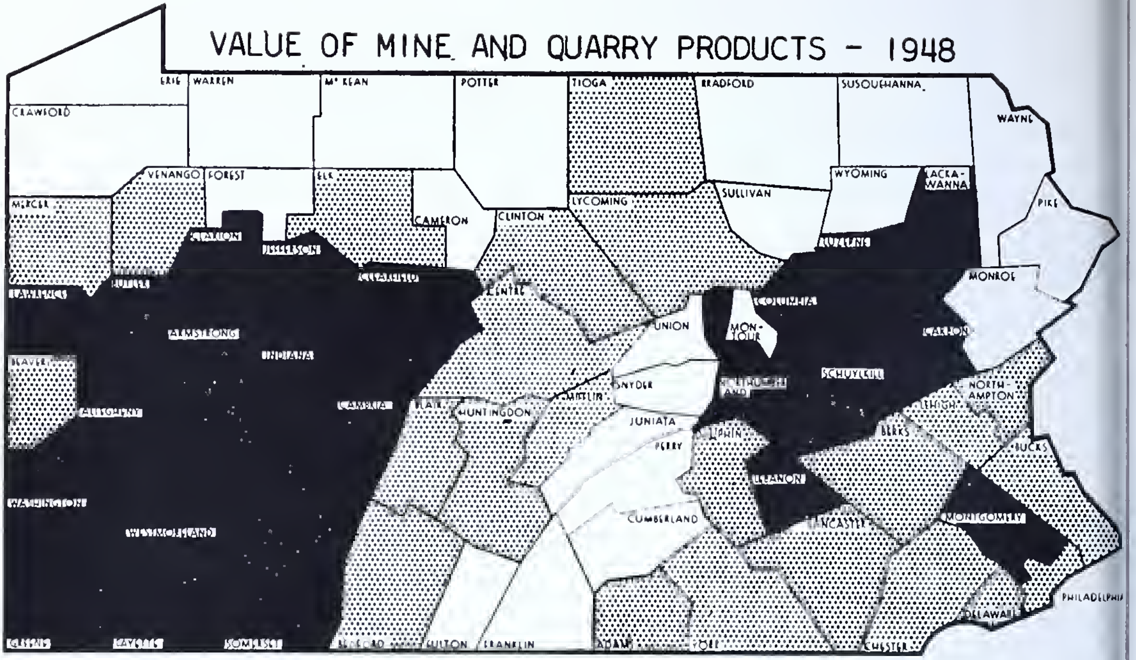
Such changes are the inevitable effect of a great war. Many of the gains and losses represent the continuance of long-term trends toward the adjustment of population to the changing resources and demands of the State's industrial economy. It is usual, however, for a considerable readjustment to take place after such a period of concentration, and it is unlikely that all the counties showing a population loss in 1950 will be in the losing column by 1960. It is also extremely unlikely that the rates of growth or loss shown in these ten prosperous but troubled years will be maintained through the next decade.

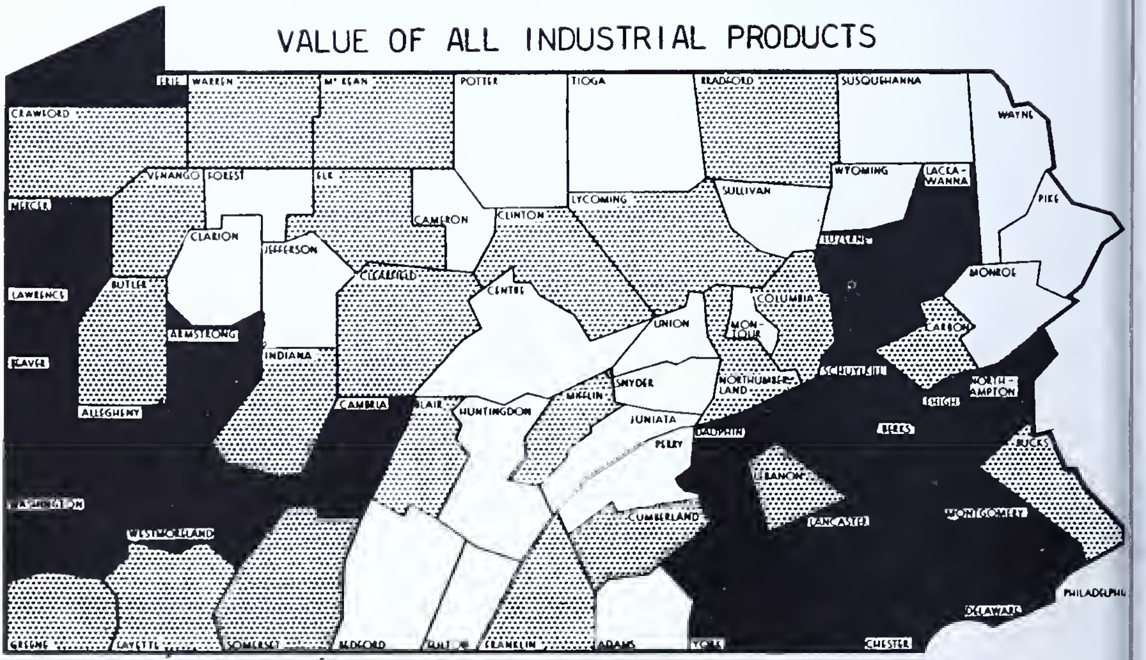
The births of the State as a whole reached an all-time high in 1947 with a total of 249,103. In the following year the total number of births was 227,282, which had been exceeded as far back as 1921. This appears to indicate that the long-term downward trend in birth *rate* will be resumed in future years as was anticipated in our issue of Pennsylvania Planning of May, 1942.

Until the publication of final reports from the United States Census of 1950, it will be impossible to provide reliable figures as to age and sex distribution by cities or towns or to verify the anticipated increases in the percentage of older people in the population, both in the State and the Nation. One thing is certain, however: the number in the age group, one to five, will show a striking increase in 1950 and there will also be a marked addition in the percentage of older persons.

Preliminary estimates based on the 1940 life table indicate that the number of Pennsylvanians sixty-five years and over will approximate 900,000 in 1950 and will comprise 8.0 percent of our total population as compared with 6.8 percent in 1940; 6.3, in 1930; and 4.4, in 1920. By 1960, if present trends continue, ten percent of the State's population will be in this older age group.

On the other hand, the population aged ten to twenty, both in Pennsylvania and in the United States, will form a much smaller percentage of our total than was true ten or twenty years ago. This is due to the very low birth rate in the years 1932 to 1941. During the next decade, there will be a distinct decline in the number of young men and women entering the ranks of workers, reversing the condition which existed during the final depression years of 1937-8-9, when it was so difficult for inexperienced workers to find places in either industry or business because of the large number of those in their own age group who were also seeking their first jobs.


VALUE OF MINE AND QUARRY PRODUCTS - 1948


VALUE OF ALL INDUSTRIAL PRODUCTS

BLACK - 22 HIGHEST RANKING COUNTIES
GREY - 23 MIDDLE RANKING COUNTIES
WHITE - 22 LOWEST RANKING COUNTIES

MANUFACTURES, MINES AND QUARRIES *(Table II)*

The data in this and the two following tables are derived from the industrial records of the Department of Internal Affairs. The ranking order of the various counties in regard to employment, compensation, capital invested and value of products provides a means for estimating the relative economic importance of each county's industrial development.

Variations among these rank orders may serve to indicate certain elements of strength or weakness in a county's productive industries.

It should be noted that wages and value of products are greatly influenced by the type of manufacture or by the nature of the raw materials produced by a county's mines and quarries. The data on Table II, however, provide a general picture of the degree of industrialization among the counties in the year (1948) in which Pennsylvania production and wages reached the highest values ever recorded.

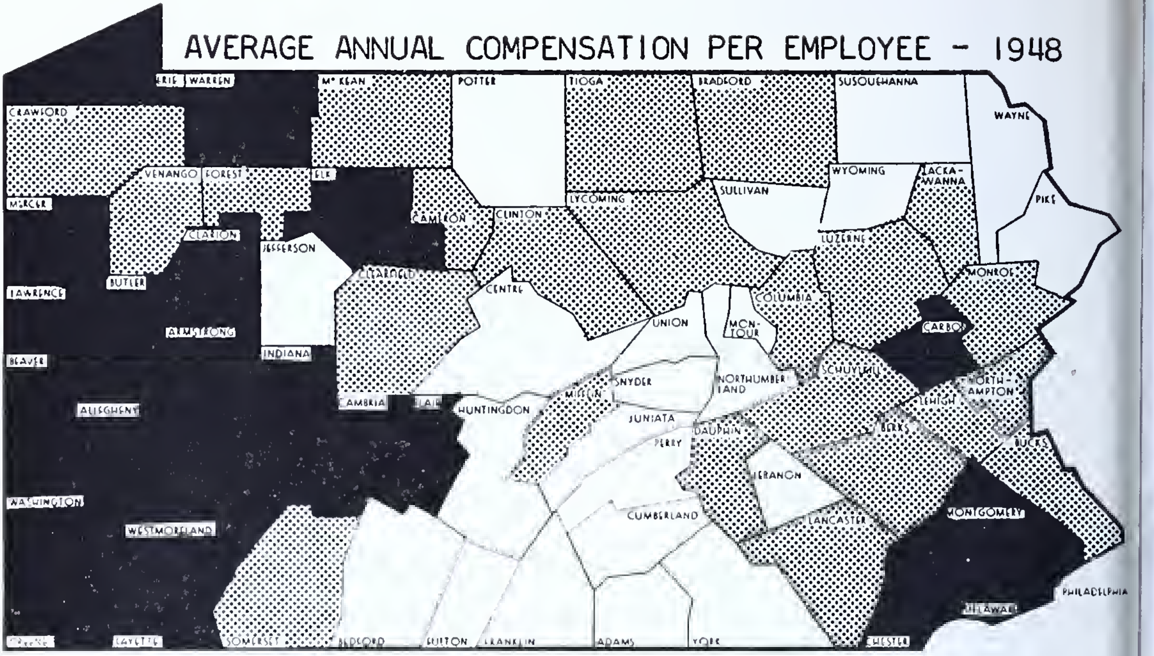
OPERATING RATIOS *(Table III)*

This table provides a series of calculated operating ratios based on Table II. These ratios may provide, both in the actual amounts shown and in the county ranking orders, a means of estimating the comparative value to the community of its local industries.

It should be noted, however, that in certain of our agricultural counties where industry is seasonal, compensation which is reported on an annual basis is likely to appear relatively low.

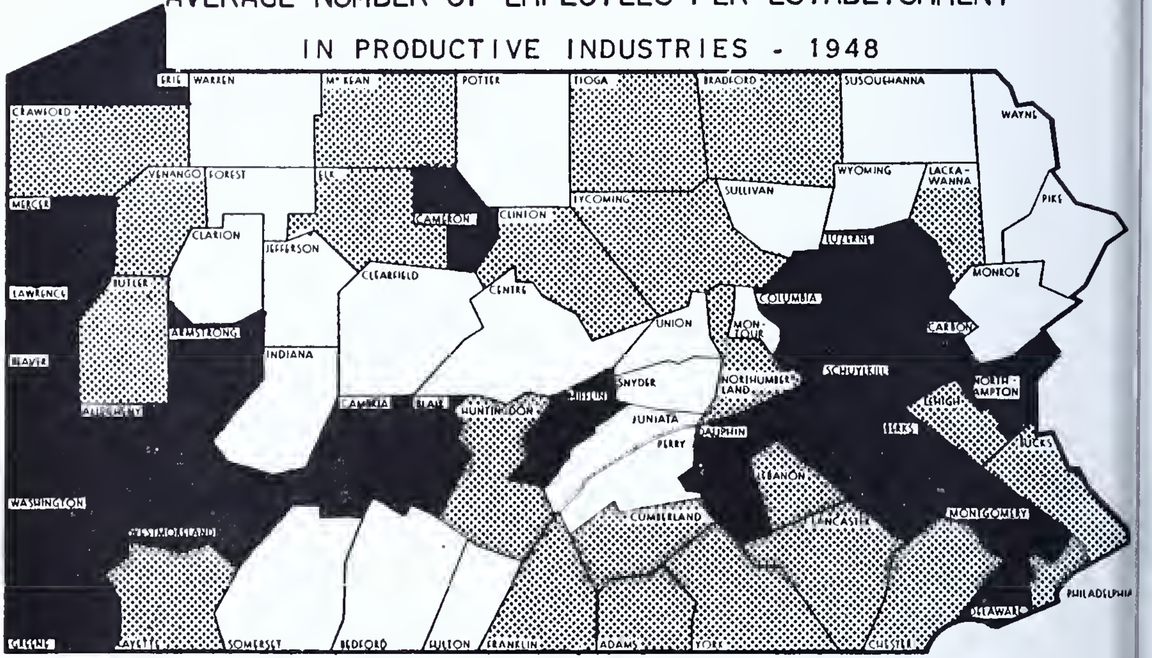
Capital invested per employe is relatively high in counties containing such large and costly industrial establishments as integrated steel mills, oil refineries or ship yards, since such establishments involve the investment of many millions of dollars. Capital investment

AVERAGE ANNUAL COMPENSATION PER EMPLOYEE - 1948



AVERAGE NUMBER OF EMPLOYEES PER ESTABLISHMENT

IN PRODUCTIVE INDUSTRIES - 1948



BLACK - 22 HIGHEST RANKING COUNTIES
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may also be high relative to other factors listed in these tables in counties with extensive but undeveloped mineral resources.

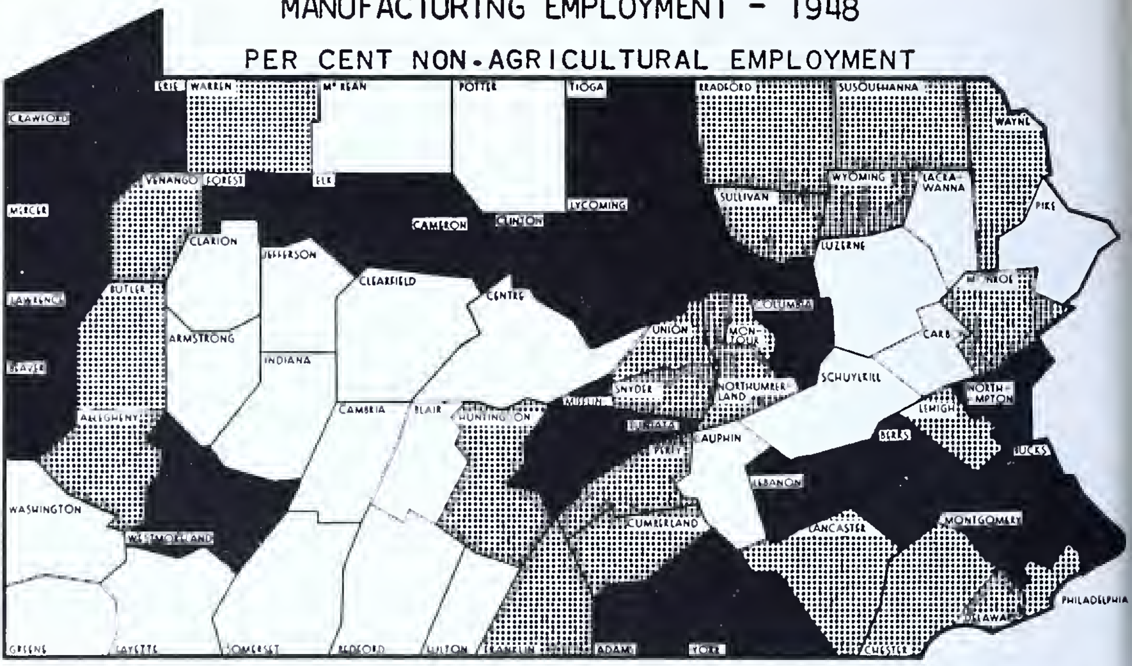
The final column of this table provides information as to the average employment per industrial establishment in 1948. These data are the first of the several columns which give clues as to the extent of industrial diversification in the counties.

The average employment in Pennsylvania's industrial establishments in 1948 was 86 workers. A relatively high record of employment per establishment is generally an indication of the dominance of heavy industries in the county's economy or the influence of one or more very large establishments on the average of employment. A sound diversification of industry is one in which no single establishment or no single type of industry so completely dominates a county's picture as to threaten a paralysis of business if the demand for its products should temporarily or permanently decline.

On the other hand, while small establishments complement the large ones in a healthy economic picture, a very low employment per establishment is generally indicative of a lack of industrial development and has often been associated with a high public relief load in periods of depression, since many small establishments do not possess the resources to carry them through a period of unfavorable economic weather. The most stable conditions are generally found in the counties which do not exhibit extremes of high or low employment per industrial establishment.

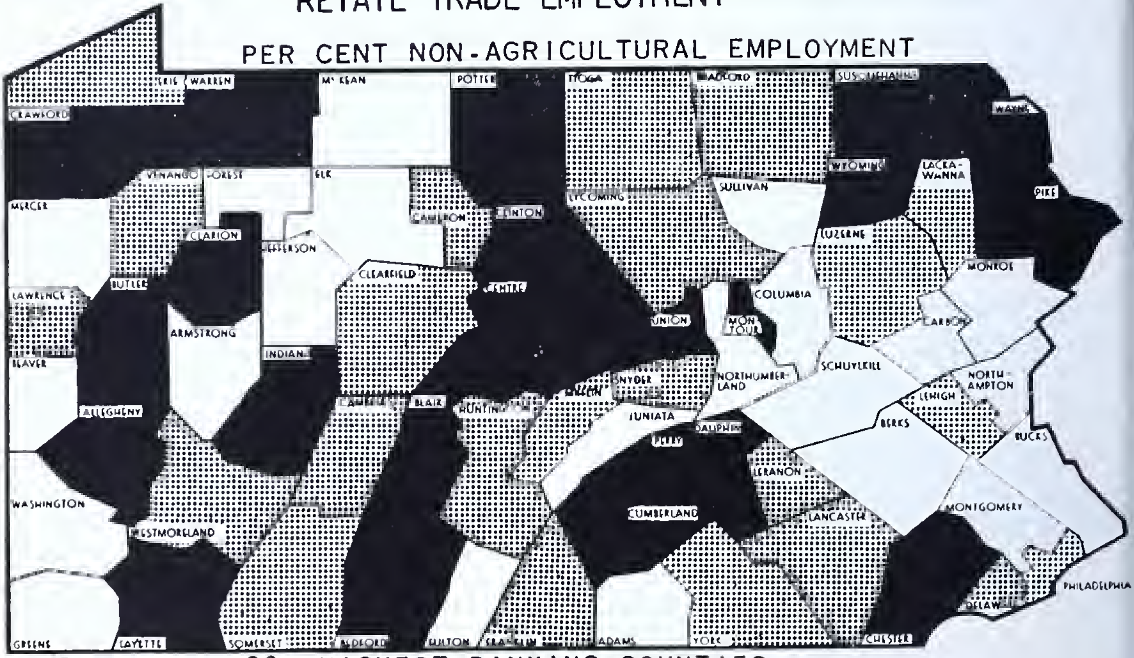
MANUFACTURING EMPLOYMENT - 1948

PER CENT NON-AGRICULTURAL EMPLOYMENT



RETAIL TRADE EMPLOYMENT

PER CENT NON-AGRICULTURAL EMPLOYMENT



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MEASURES OF DIVERSIFICATION *(Tables IV and V)*

One important factor in the industrial stability of any area is the extent of diversification of products and types of employment. For this reason, two tables are presented which provide some of the significant facts through which one may estimate the relative soundness of a county's economy.

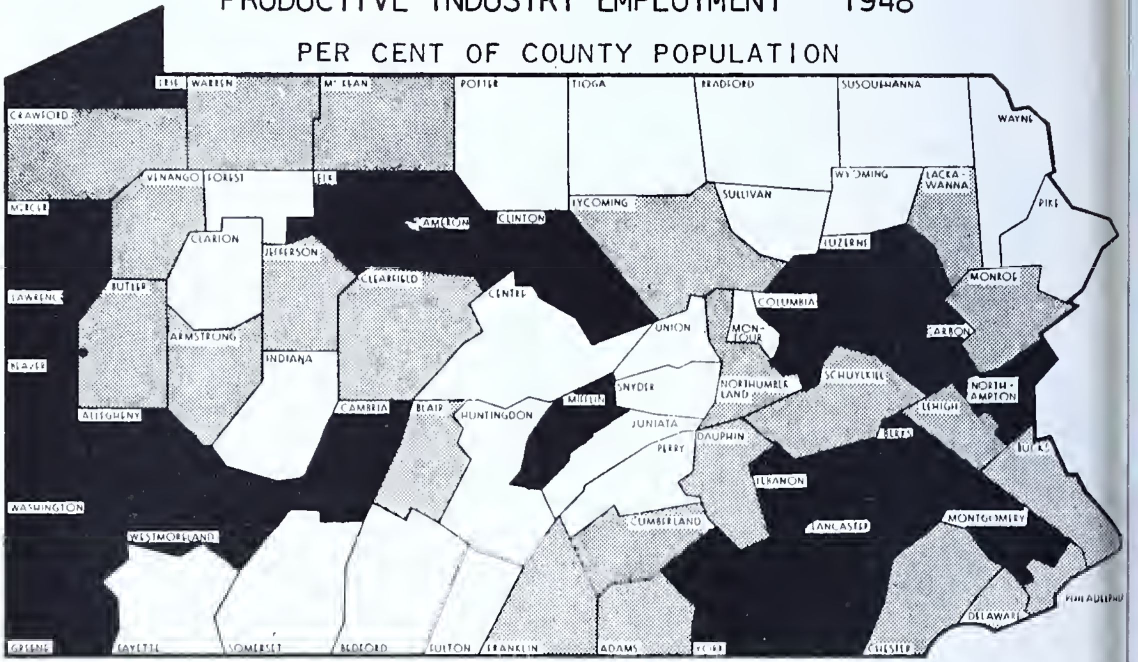
Many of our counties exhibit a very satisfactory balance between various types of industrial production. It will be seen, however, that in thirteen of our counties, metals and metal products, which include basic steel and iron, machinery and electrical equipment, account for more than half of all employment. Textiles and apparel, and mine and quarry products each provides more than forty percent of the employment in nine counties. In this table, as in most others, the State totals are provided as a bench mark for determining whether a county's industries are more or less specialized than those of the Commonwealth as a whole.

In Table IV particular attention should be paid to Column 5, which lists the percentage of employment in industries other than metals, textiles, mines and food products. In some cases, a high percentage of employment recorded in this column may be due to such specialized industries as the production of petroleum in McKean and Venango counties or the paper and forest products of Forest and Elk. In many cases, however, a high proportion of manufacturing employment registered in this column is evidence of diversification. The interpretation of such data should be clear to local interests.

The first five columns of Table IV should also be considered in connection with Column 6, which indicates the percentage of a county's population engaged in the manufacturing and extractive industries. Where that percentage is high, it is obvious that the distribution of manufacturing employment is of far greater concern to the county's economy than in cases where industry sup-

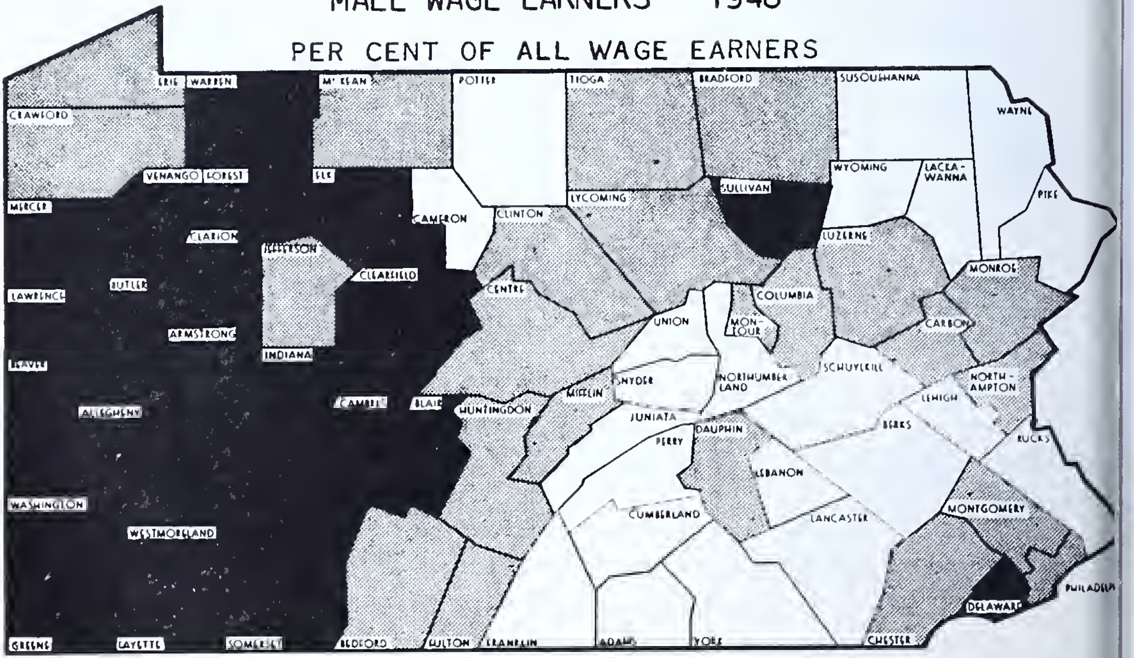
PRODUCTIVE INDUSTRY EMPLOYMENT - 1948

PER CENT OF COUNTY POPULATION



MALE WAGE EARNERS - 1948

PER CENT OF ALL WAGE EARNERS



BLACK - 22 HIGHEST RANKING COUNTIES
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ports only a small proportion of the population, as in Pike, Fulton and Perry counties.

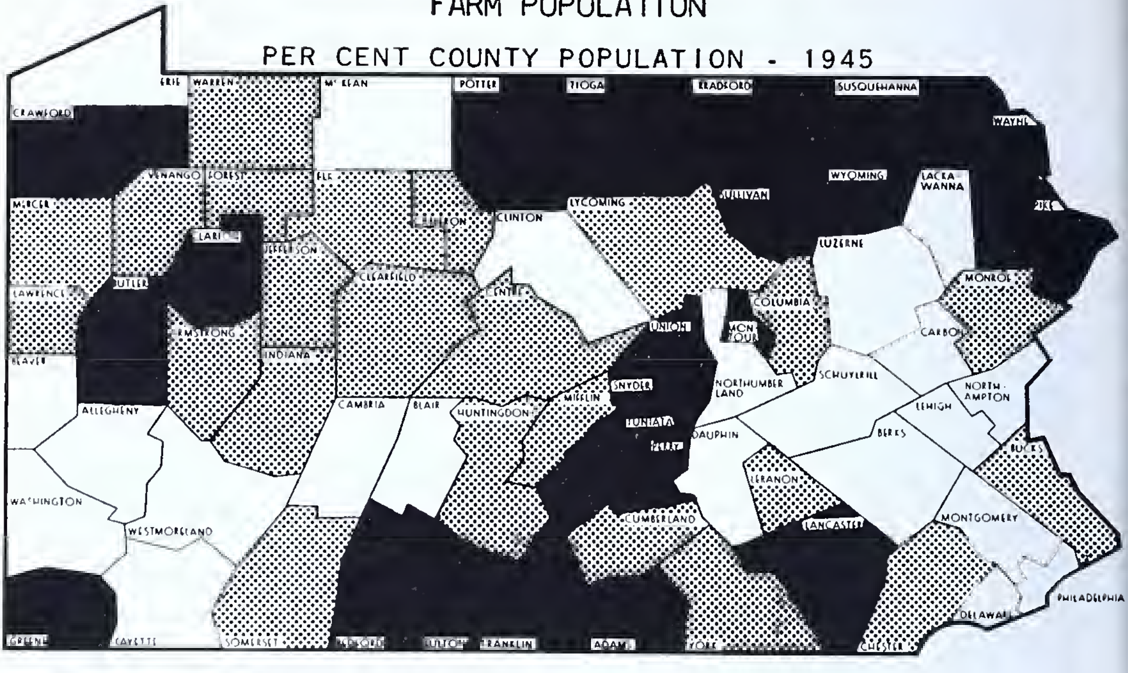
Column 1 of Table V records the sex distribution of industrial wage earners. Comparison with the percentage of change shown in Column 2 will give some indication of the progress or lack of progress toward the diversification of the county's industries. Where male employment is high in Column 1 but has decreased in the past eight years, as indicated by a negative percentage in Column 2, it may be assumed, in most cases, that an increase in the lighter types of industry has occurred. On the other hand, if a county with a high female employment is shown to have further decreased the percentage of male employment during the years covered by the data, it is very likely that the industrial picture is becoming progressively less well balanced through a scarcity of male employment opportunties.

Table V also records the employment and payrolls in retail trade as compared with those in manufacturing.

These data are based on the records of the Federal Bureau of Old Age and Survivors Insurance.

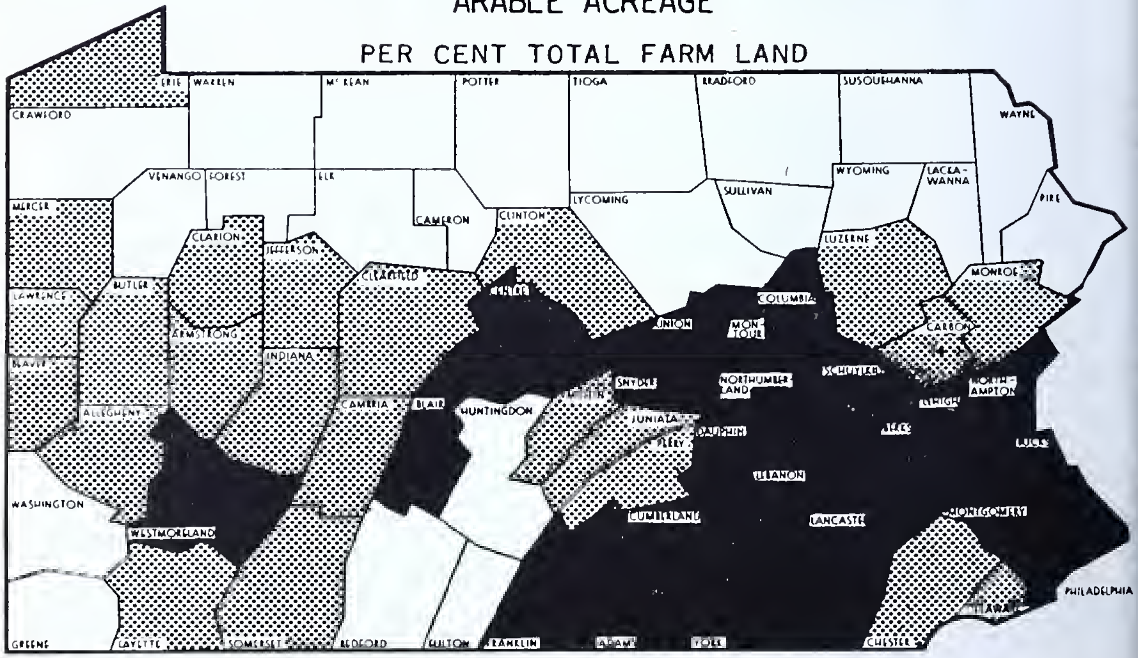
FARM POPULATION

PER CENT COUNTY POPULATION - 1945



ARABLE ACREAGE

PER CENT TOTAL FARM LAND



BLACK - 22 HIGHEST RANKING COUNTIES
GREY - 23 MIDDLE RANKING COUNTIES
WHITE - 22 LOWEST RANKING COUNTIES

AGRICULTURE *(Tables VI and VII)*

These tables deal with rural population and agricultural production and with other factors significant for the determination of the importance of farming to a county's economy. Studies made by the State Planning Board have indicated that a prosperous agricultural background is one of the best assurances any county can have of freedom from the more serious consequences of industrial depression.[1] In these studies it was demonstrated that a high degree of diversification and a high value of products per farm are the two factors which singly or in combination offer the best guarantees of continued prosperity, both in good times and in bad.

The data in these two tables are from the 1945 Census of Agriculture.

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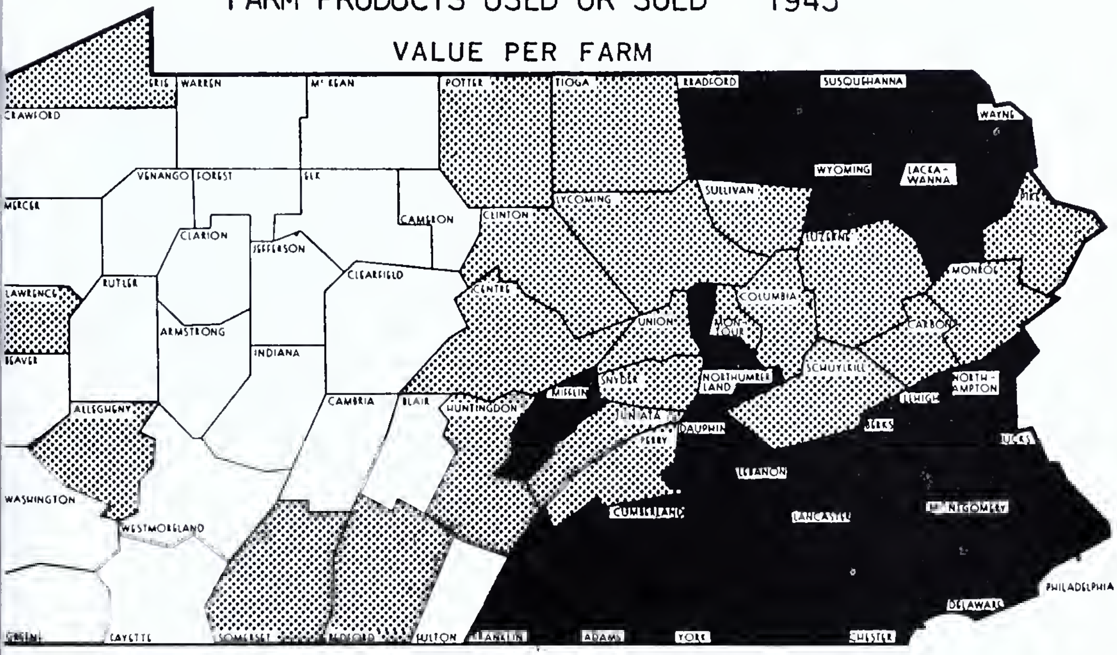
[1] "Recent Industrial Trends and New Employment Opportunities in Pennsylvania." Pennsylvania State Planning Board, 1944.

FARM PRODUCTS USED OR SOLD - 1945

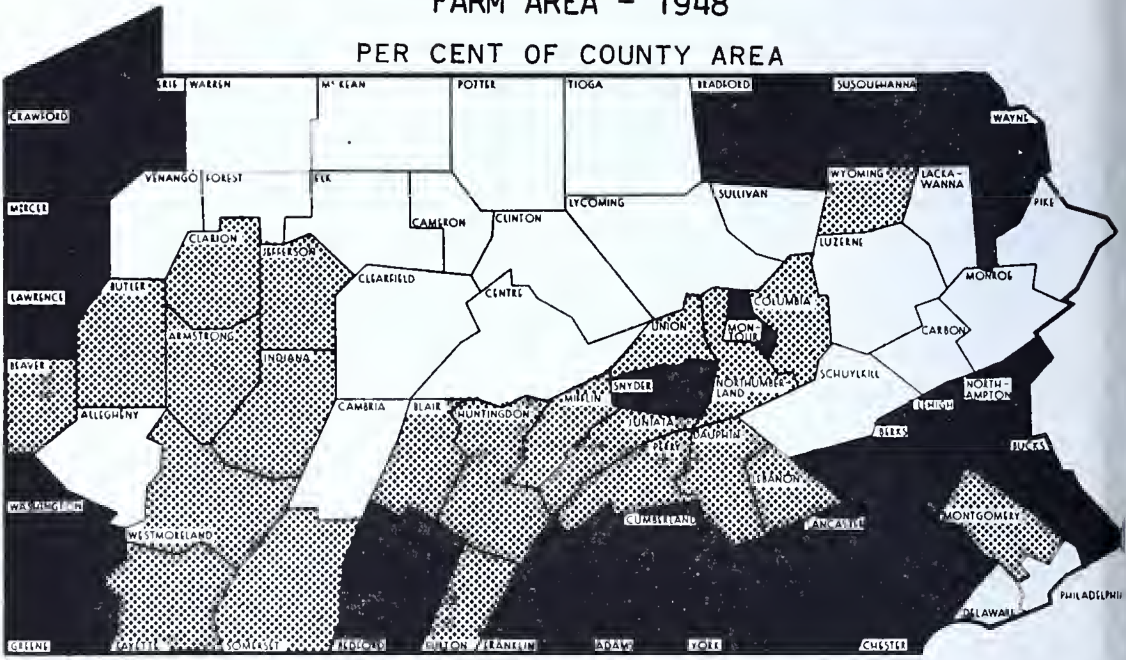
VALUE PER FARM



BLACK - 22 HIGHEST RANKING COUNTIES

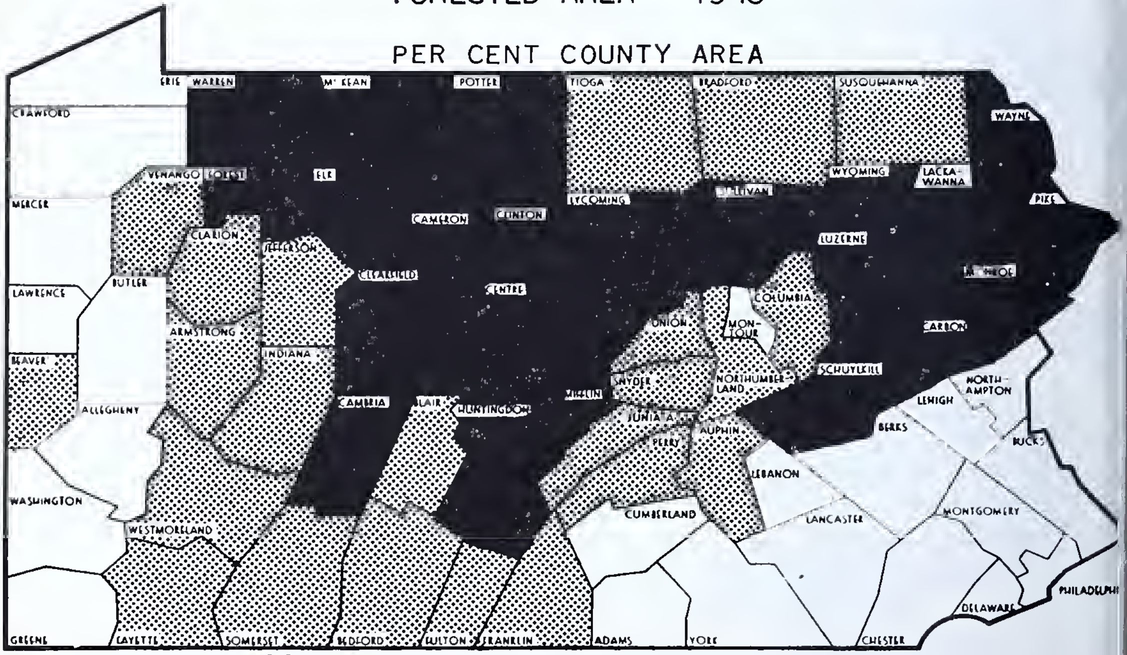
GREY - 23 MIDDLE RANKING COUNTIES

WHITE - 22 LOWEST RANKING COUNTIES



FARM AREA - 1948

PER CENT OF COUNTY AREA



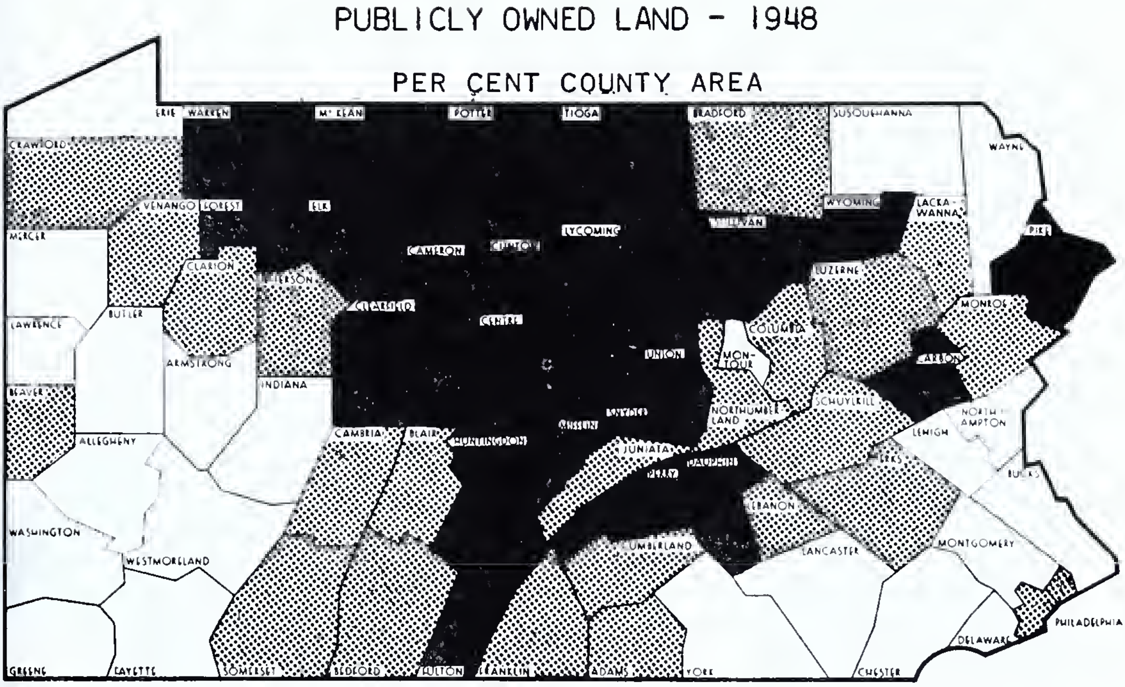
FORESTED AREA - 1948

PER CENT COUNTY AREA

BLACK - 22 HIGHEST RANKING COUNTIES

GREY - 23 MIDDLE RANKING COUNTIES

WHITE - 22 LOWEST RANKING COUNTIES



PUBLICLY OWNED LAND - 1948

PER CENT COUNTY AREA

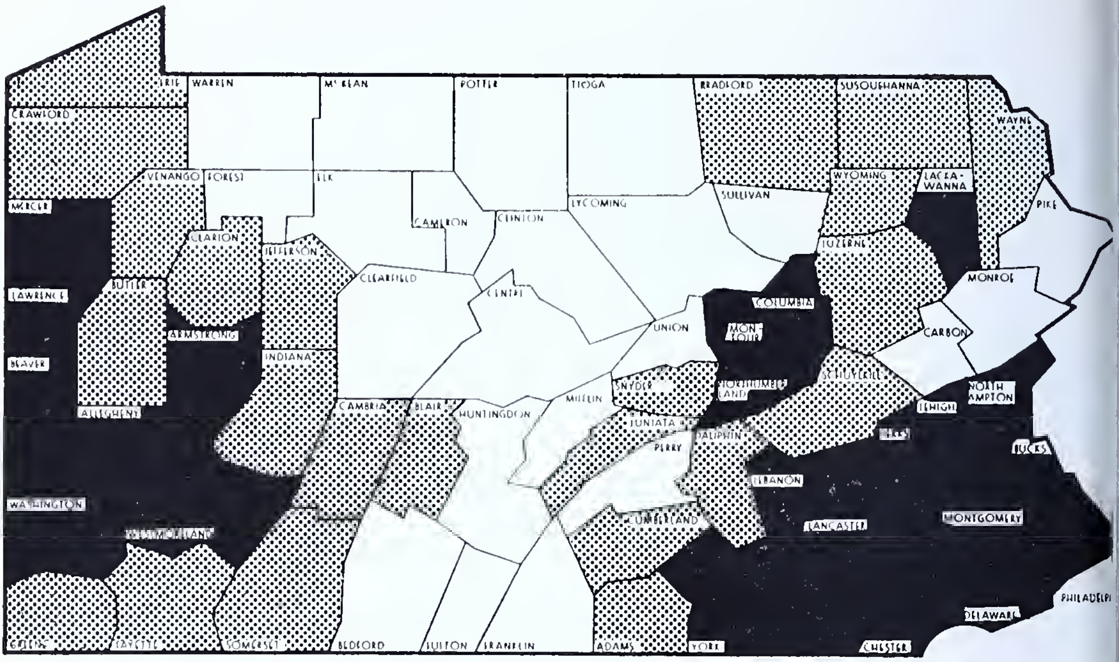
PUBLICLY OWNED LAND *(Table VIII)*

Table VIII provides information as to the publicly owned land, including federal, state, county and municipal properties but excluding playgrounds, land in the possession of school districts or land surrounding public buildings and institutions of the Commonwealth.

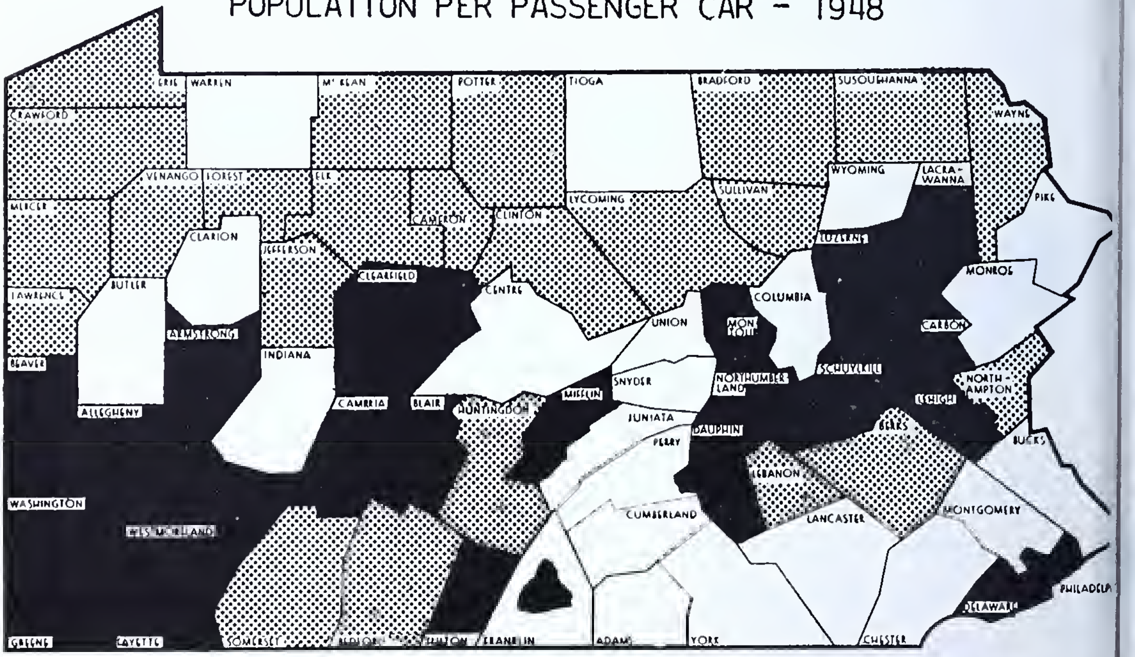
The listed holdings of 2,636,694 acres of State-owned land as of 1948 include State property administered by the Department of Forests and Waters and that held by the Fish and the Game Commissions. The larger acreages of federal land are those included in the Battlefield of Gettysburg in Adams County and in the Allegheny National Forest.

The information as to county and municipally owned forests and parks is derived from two independent sources. There is therefore a possibility of some duplication in the data although every effort has been made to eliminate overlapping of acreages.

MILES OF PUBLIC ROADS PER SQUARE MILE OF AREA - 1948



POPULATION PER PASSENGER CAR - 1948



BLACK - 22 HIGHEST RANKING COUNTIES

GREY - 23 MIDDLE RANKING COUNTIES

WHITE - 22 LOWEST RANKING COUNTIES

FOREST LAND AND HIGHWAY MILEAGE *(Table IX)*

Table IX covers the distribution of forest land and the mileage of public highways. Great contrasts are evident in the percentage of county area in forest land. Some counties, such as Cameron and Forest, have more than ninety percent of their area in woodland. Counties, such as Lehigh and Lancaster, with a high percentage of their land under cultivation, are among the lowest in their percentage of forest acreage, although even in Philadelphia, of a total of 135 square miles, eleven are in woodland.

Columns 3 to 6 in Table IX deal with the mileage of public highways including those under both State and local control. The miles of public road per square mile of area are necessarily higher in the more densely populated counties, particularly those in the neighborhood of Philadelphia and Pittsburgh.

MOTOR VEHICLES *(Table X)*

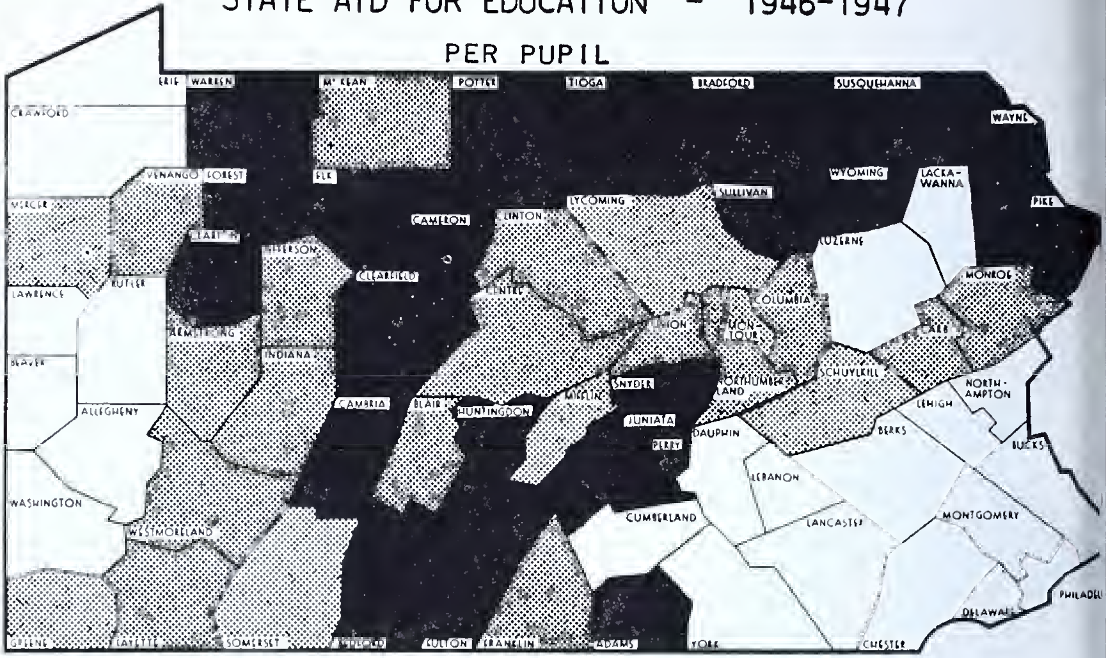
This table lists the passenger car and commercial vehicle registration by counties and also shows the population per passenger car in 1948. Population per passenger car, as the map on page 20 will illustrate, is generally lowest in the rural counties and highest in the sections providing the greatest facilities for public transportation, although comparative income also influences the number of persons per car within a given area.

WEALTH AND FINANCE *(Table XI)*

Table XI deals with factors bearing upon the wealth of the State. It lists the marketable value of taxable real estate as determined by the State Tax Equalizaion Board, the total taxes collected by local government in 1948, excluding taxes assessed and collected under the new tax provisions of Act No. 481 of the 1947 General Assembly.

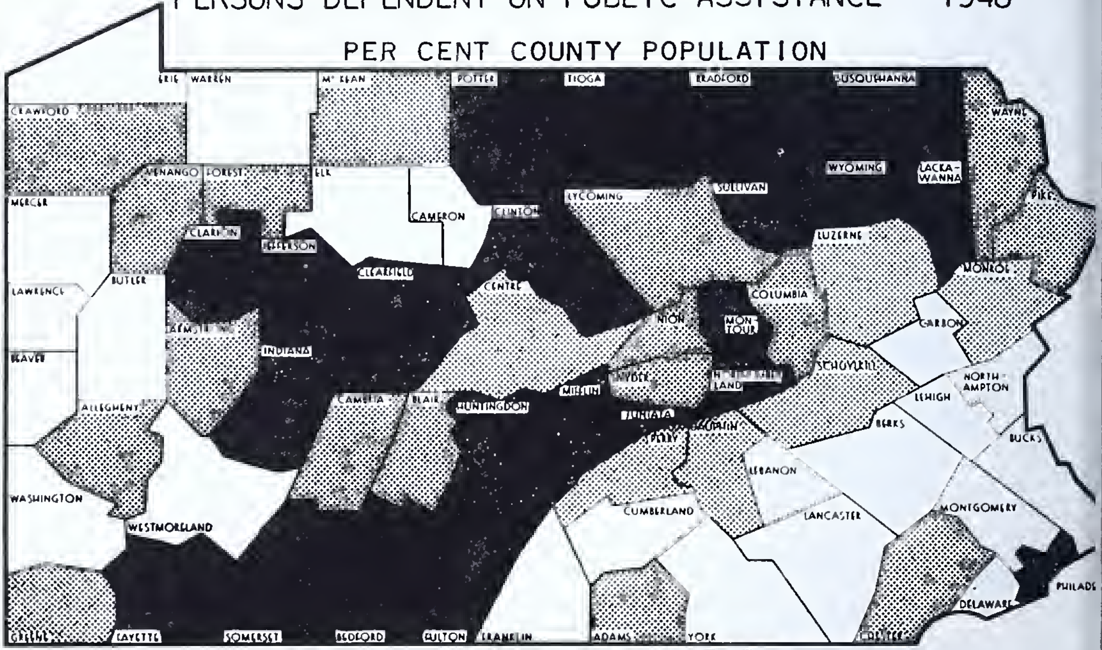
STATE AID FOR EDUCATION - 1946-1947

PER PUPIL



PERSONS DEPENDENT ON PUBLIC ASSISTANCE - 1948

PER CENT COUNTY POPULATION



BLACK - 22 HIGHEST RANKING COUNTIES
GREY - 23 MIDDLE RANKING COUNTIES
WHITE - 22 LOWEST RANKING COUNTIES

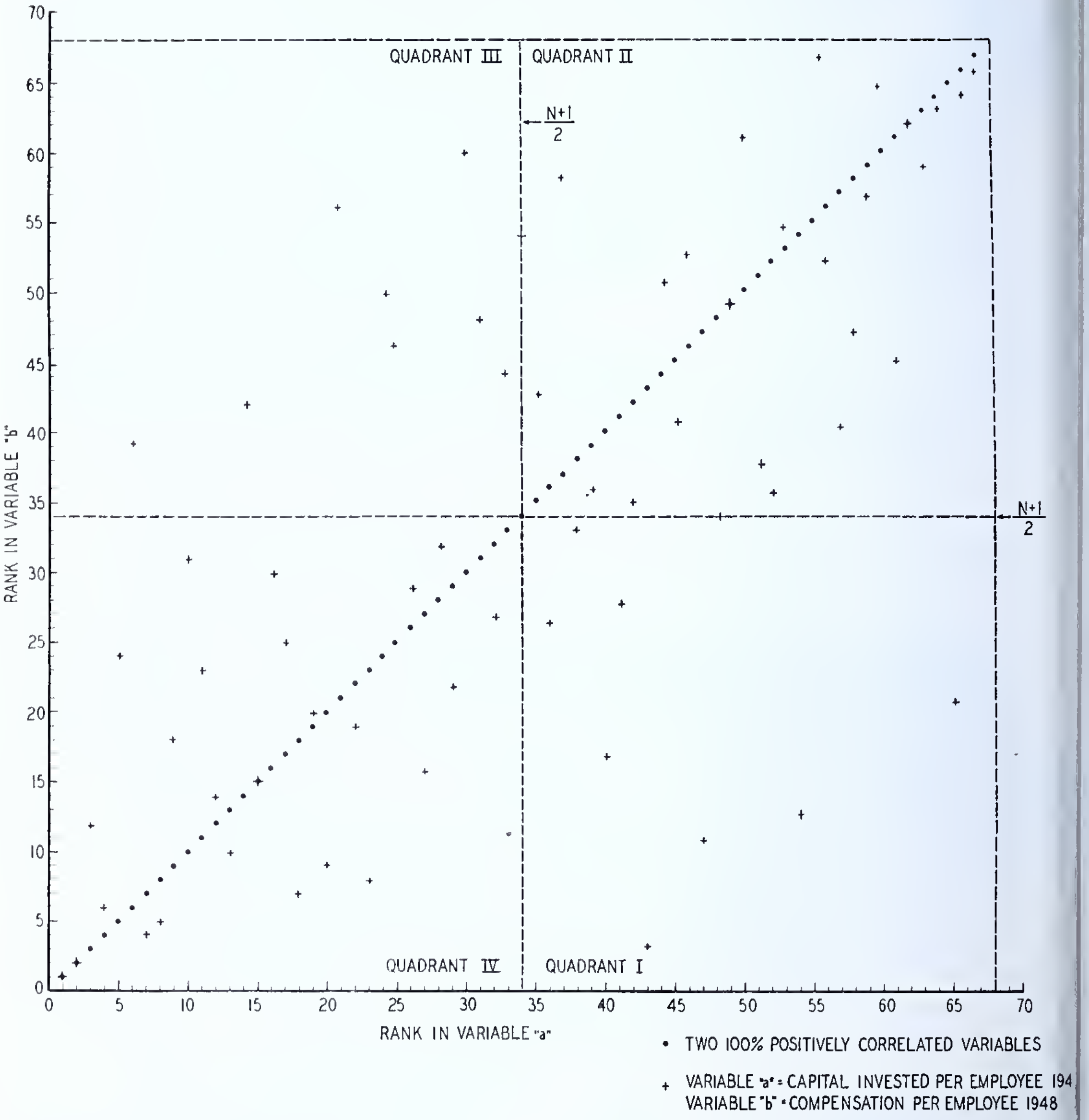
It also lists the demand and time deposits by counties in all Pennsylvania banks, including both national banks and those operating under the supervision of the State Department of Banking. Comparison of the demand and time deposits in the various counties provides an interesting insight into the saving habits of the people of the State. In thirty-four of our counties, or almost exactly half, savings deposits exceed demand deposits, although, in the State total, demand deposits exceed savings by approximately one and one-half billion dollars. This balance of demand over savings rests chiefly on a heavy excess of demand deposits in Philadelphia and Allegheny Counties, the State's leading commercial banking centers.

PUBLIC EXPENDITURES *(Table XII)*

Table XII deals with two of the larger items of State expenditure, education and public assistance. It lists the State appropriation for education in the 1947-48 school year, the last for which data are presently available, the State appropriation per pupil and the total education cost per pupil. It also provides information as to the number of persons on public assistance, their percentage of the county's estimated population, and the expenditures per county for public assistance in the year 1948.

Nearly all data provided in these county tables have been ranked. Since the number of counties in Pennsylvania is sufficiently large to establish a high degree of confidence in the existence of a relationship when the agreements between ranking orders exceed a determinable number, we are including in an appendix to these maps and tables a brief statement of the method by which the existence of a correlation between two sets of ranked data may be determined.

RANK ORDER SCATTER DIAGRAM FOR ALL PENNSYLVANIA COUNTIES



Use of Ranked Data for Determining Correlation

Manufacturers and merchants as well as students of sociology frequently must determine whether or not there is a relationship between two variable factors. For example, are retail sales per capita related to population density? Will compensation per employe be influenced by the capital invested per employe? Does population density influence the number of persons dependent on public relief? These and similar questions can be answered rapidly when ranked data are available.

Method

Suppose we consider a sample composed of the sixty-seven counties of Pennsylvania and we wish to determine whether or not capital invested per employe will influence the average wage and salary payment. Both these factors have been ranked by counties for 1948 in this publication.

Using this ranked data, the following procedure should be followed:

1. For each county, compare its rank in capital invested per employe with its rank in compensation per employe.

2. If a county ranks 33 or less in *both* factors, call this an agreement. If it ranks more than 34 in *both* factors, call this an agreement as well. If the county ranks 33 or less in *one* factor and more than 34 in the *other* factor, call this a disagreement.

3. For rank 34 of either variable, consider it an agreement if the other variable lies between ranks 17 and 51.

4. Count the number of agreements.

5. The following table defines the probability of correlations for a sample of size 67.

TABLE A

NUMBER OF AGREEMENTS

	Positive Correlation	*Negative Correlation*
Possible Correlation	More than 38	Less than 29
Probable Correlation	More than 42	Less than 25
Highly Probable Correlation	More than 46	Less than 21

Using the procedure outlined above, we observe that there are 50 agreements between the rankings in capital invested per employe and the rankings in compensation per employe. An examination of Table A reveals that we may make the assertion that in Pennsylvania it is highly probable a positive correlation exists between capital invested per employe and compensation per employe.

The same method can be followed for any two variables. Care must be taken as to the direction in which the data are ranked before asserting whether a particular correlation is positive or negative.

Validity of Method

If each county's rank in variable "a" were plotted versus its rank in variable "b", and the two variables were positively correlated 100 percent, a linear distribution would result as shown in the diagram on page 24.

Notice that all the points fall in quadrants II and IV except for rank 34. In the case of absolutely no correlation we would expect the points to be randomly distributed in all four quadrants. If the correlation were negative, there would be a tendency for points to accumulate in quadrants I and III.

Each point may be described as falling in quadrants I or III or in quadrants II or IV. To accommodate the median value with an odd number of specimens, it is assumed that an agreement will exist when the ranking with respect to the other variable falls in the interval $\frac{N+1}{2} \pm \frac{N+1}{4}$. Probabilities of an individual value representing two non-correlated variables falling within the interval is approximately fifty percent, which is consistent with the probabilities of an occurrence in quadrants II and IV. Only two possibilities exist, on this basis, and the problem reduces itself to a binomial distribution.

Let $N =$ size of sample
$A =$ agreements
$D =$ disagreements
$S =$ standard deviation of sample
$P =$ number of standard deviations.

From the character of the binomial distribution we know that for large values of N[1]

$$S = \sqrt{\frac{AD}{N}}$$

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[1] In this discussion it is assumed that the binomial distribution can be approximated by the normal distribution. This assumption does not necessarily hold for small values of N, but is fairly reliable for a sample exceeding ten.

For a case of zero correlation, the number of agreements would be $\frac{N}{2}$ plus or minus the variation due to chance causes. The probable chance variation may be expressed in terms of "S", so that the number of agreements for zero correlation will be

$$A_0 = \frac{N}{2} \pm P\sqrt{\frac{AD}{N}}$$

$$= \frac{N}{2} \pm P\sqrt{\frac{\left(\frac{N}{2}\right)\left(\frac{N}{2}\right)}{N}}$$

$$= \frac{N}{2} \pm \frac{P}{2}\sqrt{N}$$

A value of $P = 1$ will include approximately 68.3% of the chance variation; $P = 2$ will include approximately 95.4% of the chance variation; $P = 3$ will include approximately 99.7% of the chance variation. These values of P have been used to determine the limits of probable correlation and have been designated, respectively, possible correlation, probable correlation and highly probable correlation.

A correlation, either positive or negative, exists when the agreements or disagreements vary significantly from the values expected for a case of zero correlation, within the degree of confidence desired.

Summary

This technique of rank order correlation does not measure the extent of the relationship between two variables. It does indicate where more refined statistical methods may be useful to determine the probable change in one variable with a change in another.

For certain types of curvilinear correlations all rank order methods may obscure a distinct relationship between two variables. While an indication of a correlation with this present method may be considered fairly reliable the lack of an indication of a correlation should not be construed as final without more rigorous tests.

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TABLE 1—VITAL STATISTICS

OUNTIES	Population* 1950*	Rank	Population Density (Per Square Mile)	Rank	Growth Rate (1940-1950)	Rank	Natural Increase (1948)‡	Rank	Births† Per 1,000 Population (1948)	Deaths† Per 1,000 Population 1948)
s	44,084	44	84	37	11.8	14	749	37	25.1	8.7
eny	1,508,258	2	2,025	3	6.9	26	18,489	2	22.8	10.2
trong	80,626	32	121	31	— 0.6	43	885	35	20.2	9.5
er	174,948	19	391	9	11.6	15	1,665	20	18.3	8.5
ord	40,668	48	40	57	— 0.4	41	310	53	18.1	10.2
	254,454	8	295	12	5.2	29	2,300	14	20.1	10.8
	138,934	22	262	16	— 1.0	48	1,881	17	22.5	10.1
ord	51,479	41	45	53	1.7	34	616	42	24.0	11.9
	144,234	21	230	22	33.9	1	1,148	28	19.1	9.8
r	97,290	27	122	29	11.1	17	1,325	25	22.9	8.4
ria	208,546	12	300	11	— 2.3	49	3,322	7	22.6	8.2
ron	7,105	65	17	63	3.7	32	27	66	10.7	6.9
on	57,331	38	141	28	— 7.1	59	344	51	15.8	10.4
e	65,642	36	59	47	24.8	4	1,449	22	36.8	10.2
er	158,691	20	208	25	17.0	8	1,667	19	21.8	10.2
on	38,384	49	64	46	— 0.1	39	254	55	16.5	9.9
field	85,622	29	75	43	— 7.0	58	699	39	17.2	9.2
on	36,340	50	40	56	5.2	30	511	47	24.3	10.5
mbia	53,504	40	110	32	4.1	31	484	48	20.5	11.4
ford	78,604	33	76	40	9.7	21	1,023	32	23.0	10.4
berland	94,079	28	170	26	25.8	3	1,292	26	26.6	10.9
hin	197,127	15	360	10	11.1	16	2,064	15	21.1	11.0
vare	413,065	3	2,163	2	32.9	2	4,197	3	20.1	9.4
	34,233	52	42	54	— 0.6	44	589	44	26.3	9.0
	218,407	10	267	15	20.7	7	3,120	8	25.1	10.1
tte	189,432	17	235	21	— 5.8	55	2,368	13	21.6	9.5
t	4,919	67	12	67	—15.1	67	29	65	15.6	10.1
klin	76,045	35	101	34	9.6	22	1,077	30	21.8	7.4
n	10,364	63	24	62	— 2.9	51	104	60	17.2	8.5
e	45,251	43	78	39	1.3	37	650	41	22.3	9.6
ingdon	40,750	47	46	51	— 2.6	50	523	45	22.4	10.4
na	76,889	34	93	36	— 3.7	53	1,033	31	21.2	8.2
son	48,824	42	75	42	— 9.7	62	937	34	28.1	10.1
ta	15,226	62	39	58	— 1.0	47	120	59	16.6	9.2
awanna	256,494	7	560	6	—14.9	66	1,994	16	19.6	11.9
aster	234,137	9	240	20	10.2	20	3,055	9	23.4	10.0
ence	105,085	25	287	13	8.5	24	1,449	22	24.3	9.7
non	81,415	31	225	23	12.1	13	1,001	33	19.9	8.2
h	196,789	16	565	5	10.8	18	2,936	11	24.6	9.6
ne	391,219	4	434	8	—11.4	64	3,705	5	18.4	9.7
ming	100,903	26	83	38	7.8	25	1,242	27	23.8	11.3
an	56,286	39	56	48	— 0.7	45	694	40	21.4	9.3
r	111,530	24	164	27	10.4	19	1,515	21	24.1	10.2
n	43,559	45	101	33	1.3	36	780	36	27.4	9.5
oe	33,627	53	54	49	12.8	11	337	52	24.2	13.8
gomery	350,804	5	706	4	21.3	6	3,752	4	21.4	10.0
our	15,973	61	122	30	3.3	33	608	43	57.4	18.9
ampton	183,712	18	487	7	8.7	23	1,389	24	18.2	10.6
umberland	116,889	23	249	18	— 7.9	60	512	46	15.3	11.0
	24,728	56	45	52	6.5	27	293	54	22.6	10.3
delphia	2,057,210	1	15,239	1	6.5	28	19,838	1	20.3	11.1
	8,367	64	15	65	12.3	12	—47	67	4.4	10.7
r	16,752	59	15	64	— 8.0	61	83	63	16.4	11.5
ylkill	200,281	14	255	17	—12.3	65	1,869	18	19.3	10.8
er	24,524	57	75	44	21.4	5	218	56	20.4	10.6
rset	81,635	30	75	41	— 3.9	54	1,134	29	22.4	8.9
van	6,720	66	14	66	—10.5	63	38	64	15.2	10.0
ehanna	31,845	54	38	59	— 6.0	56	145	58	15.1	10.5
	35,384	51	31	61	1.1	38	420	50	24.2	11.8
	23,095	58	73	45	14.1	9	458	49	32.8	11.1
ngo	65,038	37	95	35	1.7	35	732	38	21.5	10.2
en	42,579	46	46	50	— 0.5	42	88	61	18.0	15.7
ington	209,001	11	243	19	— 0.9	46	2,949	10	22.9	9.1
ne	28,004	55	36	60	— 6.5	58	87	62	15.5	12.4
moreland	293,859	6	286	14	— 3.2	52	3,648	6	20.7	8.9
ming	16,676	60	41	55	— 0.2	40	184	57	25.5	13.9
	202,430	13	221	24	13.7	10	2,422	12	21.5	9.6
State	10,435,965		230		5.4		118,322‡		21.7	10.4

. S. Census. (Preliminary Figures.)
ennsylvania Bureau of Vital Statistics.
ncludes 1,543 out-of-state births and deaths.

TABLE II—INDUSTRIAL STATISTICS—1948
(Amounts in Thousands of Dollars)

COUNTIES	Establishments	Rank	Total No. of Employes	Rank	Total Wages and Salaries	Rank	Capital Invested	Rank	Value of Products
Adams	100	43	6,603	45	$10,246	50	$10,646	49	$38,357
Allegheny	2,136	2	259,130	2	840,395	2	1,219,535	1	3,162,129
Armstrong	139	35	12,752	29	40,818	27	36,200	29	210,652
Beaver	216	25	48,037	10	166,497	7	264,181	3	622,756
Bedford	91	45	2,273	55	4,755	54	4,339	54	9,705
Berks	647	4	60,804	5	164,367	8	134,429	11	475,470
Blair	165	30	23,069	21	64,643	21	58,868	22	161,179
Bradford	75	52	5,094	48	13,812	47	12,397	46	50,774
Bucks	304	17	18,914	24	50,523	24	49,579	25	174,651
Butler	193	27	12,493	31	37,967	29	59,727	21	147,556
Cambria	365	14	42,424	14	127,391	11	154,821	9	346,556
Cameron	11	67	2,471	54	6,232	53	4,811	53	17,568
Carbon	106	42	14,379	28	40,413	28	18,563	44	83,202
Centre	129	37	6,028	46	14,230	46	12,333	47	42,410
Chester	226	24	18,032	25	51,564	23	40,769	27	202,171
Clarion	112	40	3,367	52	9,646	51	8,739	50	26,721
Clearfield	277	20	12,067	32	29,471	35	28,956	34	89,323
Clinton	82	48	6,877	43	18,188	42	26,483	35	79,875
Columbia	144	34	12,569	30	31,907	32	24,056	39	119,098
Crawford	128	38	10,930	33	30,107	33	50,542	24	104,736
Cumberland	161	32	10,727	34	25,056	37	19,699	43	92,731
Dauphin	327	16	28,588	18	75,251	19	73,438	17	411,572
Delaware	375	13	54,490	7	181,138	4	241,771	4	916,913
Elk	89	47	7,604	41	21,406	41	21,466	40	75,195
Erie	429	10	52,483	8	160,109	9	110,309	13	561,700
Fayette	297	18	23,282	20	73,291	20	62,920	19	181,947
Forest	16	66	585	64	1,469	63	2,675	60	5,550
Franklin	131	36	10,304	36	22,882	40	24,825	37	79,063
Fulton	21	63	99	67	62	67	187	67	293
Greene	73	53	10,451	35	36,521	31	78,527	16	60,720
Huntingdon	82	48	5,049	49	11,628	48	10,728	48	26,698
Indiana	164	31	9,585	37	29,487	34	34,576	32	61,316
Jefferson	171	28	6,643	44	15,562	44	17,807	45	44,345
Juniata	47	58	1,218	59	1,371	64	988	65	3,379
Lackawanna	592	7	44,847	12	111,406	13	95,621	15	298,712
Lancaster	585	8	42,895	13	108,913	15	97,470	14	411,466
Lawrence	170	29	20,517	23	62,149	22	39,149	28	191,109
Lebanon	208	26	16,110	27	37,737	30	34,612	31	138,093
Lehigh	416	11	32,138	17	82,989	18	66,817	18	309,365
Luzerne	678	3	75,607	3	206,328	3	180,300	6	473,671
Lycoming	243	22	17,592	26	42,945	26	42,505	26	150,124
McKean	114	39	6,965	42	17,224	43	24,423	38	80,419
Mercer	161	32	24,553	19	83,691	17	52,920	23	326,136
Mifflin	81	51	8,874	40	23,499	38	26,030	36	64,846
Monroe	90	46	4,409	50	10,714	49	6,996	52	30,652
Montgomery	609	6	61,022	4	180,454	5	180,420	5	656,718
Montour	22	62	1,162	60	2,795	58	3,078	58	8,449
Northampton	351	15	49,960	9	136,864	10	142,191	10	455,661
Northumberland	260	21	20,802	22	50,013	25	34,913	30	179,844
Perry	64	54	1,131	62	1,890	61	1,706	63	6,437
Philadelphia	5,584	1	366,020	1	1,043,095	1	1,014,511	2	4,179,500
Pike	21	63	251	66	462	66	390	66	1,472
Potter	39	60	1,144	61	2,349	60	3,189	57	8,055
Schuylkill	416	11	36,371	16	90,458	16	61,540	20	239,030
Snyder	63	55	1,733	57	3,119	57	3,443	56	12,017
Somerset	227	23	8,895	39	23,003	39	20,447	42	47,185
Sullivan	21	63	555	65	1,020	65	1,385	64	3,564
Susquehanna	50	57	2,238	56	4,324	55	3,657	55	15,375
Tioga	57	56	3,693	51	9,460	52	8,017	51	37,964
Union	45	59	1,596	58	2,792	59	2,512	61	10,287
Venango	112	40	9,107	38	25,218	36	33,840	33	142,520
Warren	99	44	5,171	47	14,773	45	20,920	41	58,301
Washington	280	19	38,170	15	126,254	12	160,152	7	380,817
Wayne	82	48	2,560	53	4,191	56	2,830	59	16,345
Westmoreland	502	9	56,620	6	177,687	6	159,645	8	555,913
Wyoming	31	61	825	63	1,533	62	1,928	62	8,877
York	619	5	45,863	11	109,141	14	112,570	12	402,442
State	20,921		1,808,817		$5,206,895		$5,560,017		$18,587,677

SOURCE: Pennsylvania Department of Internal Affairs—Bureau of Statistics.

TABLE III—OPERATING RATIOS*—1948

COUNTIES	Value of Product Per Dollar Invested	Rank	Value of Product Per Dollar Compensation	Rank	Value of Product Per Employe	Rank	Capital Invested Per Employe	Rank	Compensation Per Employe	Rank	Average Employment Per Establishment	Rank
ns	$3.60	29	$3.74	20	$5,809	60	$1,612	60	$1,552	65	66	39
heny	2.59	51	3.76	19	12,203	7	4,706	4	3,243	6	121	11
trong	5.82	2	5.16	4	16,519	2	2,839	18	3,201	7	92	19
er	2.36	59	3.74	21	12,964	6	5,500	2	3,466	2	222	2
ord	2.24	62	2.04	66	4,270	65	1,909	53	2,092	55	25	64
r	3.54	31	2.89	49	7,820	37	2,211	41	2,703	28	94	18
a	2.74	49	2.49	58	6,987	46	2,552	29	2,802	22	140	7
ford	4.10	20	3.68	26	9,967	19	2,434	32	2,711	27	68	37
s	3.52	33	3.46	37	9,234	28	2,621	26	2,671	29	62	43
r	2.47	57	3.89	15	11,811	8	4,781	3	3,039	12	65	42
bria	2.24	61	2.72	55	8,169	35	3,649	12	3,003	14	116	13
eron	3.65	27	2.82	52	7,110	43	1,947	51	2,522	38	225	1
on	4.48	14	2.06	64	5,786	61	1,291	65	2,811	21	136	9
re	3.44	37	2.98	48	7,036	45	2,046	49	2,361	49	47	50
er	4.96	7	3.92	12	11,212	13	2,261	40	2,860	17	80	28
on	3.06	44	2.77	53	7,936	36	2,595	27	2,865	16	30	58
field	3.08	43	3.03	45	7,402	40	2,400	35	2,442	43	44	52
on	3.02	45	4.39	8	11,615	9	3,851	10	2,645	31	84	25
nbia	4.95	8	3.73	22	9,476	26	1,914	52	2,539	36	87	22
ford	2.07	64	3.48	36	9,582	24	4,624	5	2,755	24	85	24
berland	4.71	11	3.70	24	8,645	32	1,836	56	2,336	52	67	38
hin	5.60	4	5.47	3	14,397	4	2,569	28	2,632	32	87	21
ware	3.79	24	5.06	5	16,827	1	4,437	7	3,324	4	145	4
	3.50	34	3.51	32	9,889	20	2,823	19	2,815	20	85	23
	5.09	6	3.51	33	10,703	16	2,102	47	3,051	11	122	10
tte	2.89	46	2.48	59	7,815	38	2,703	23	3,148	8	78	30
st	2.07	63	3.78	17	9,487	25	4,573	6	2,511	39	37	55
klin	3.18	41	3.46	38	7,673	39	2,409	34	2,221	54	79	29
on	1.57	66	4.73	6	2,960	66	1,889	55	626	67	5	67
ne	.77	67	1.66	67	5,810	59	7,514	1	3,494	1	143	5
ingdon	2.49	56	2.30	61	5,288	64	2,125	46	2,303	53	62	44
na	1.77	65	2.08	63	6,397	55	3,607	13	3,076	10	58	46
rson	2.49	55	2.85	51	6,675	50	2,681	24	2,343	50	39	54
ta	3.42	38	2.46	60	2,774	67	811	67	1,126	66	26	63
awanna	3.12	42	2.68	56	6,661	51	2,132	45	2,484	41	76	33
aster	4.22	16	3.78	18	9,592	23	2,272	39	2,539	36	73	35
ence	4.88	9	3.08	44	9,315	27	1,908	54	3,029	13	121	12
non	3.99	22	3.66	28	8,572	33	2,148	44	2,342	51	77	31
gh	4.63	12	3.73	23	9,626	22	2,079	48	2,582	34	77	32
rne	2.63	50	2.30	62	6,265	57	2,385	36	2,729	26	112	15
ming	3.53	32	3.50	34	8,534	34	2,416	33	2,441	44	72	36
an	3.29	39	4.67	7	11,546	10	3,507	14	2,473	42	61	45
er	6.16	1	3.90	14	13,283	5	2,155	43	3,409	3	153	3
n	2.49	54	2.76	54	7,307	41	2,933	16	2,648	30	110	16
oe	4.38	15	2.86	50	6,952	47	1,587	61	2,430	45	49	49
gomery	3.64	28	3.64	29	10,762	14	2,957	15	2,957	15	100	17
tour	2.74	48	3.02	46	7,271	42	2,649	25	2,405	46	53	47
hampton	3.20	40	3.33	41	9,121	29	2,846	17	2,739	25	142	6
humberland	5.15	5	3.60	30	8,646	31	1,678	58	2,404	47	80	27
y	3.77	26	3.41	40	5,691	62	1,508	64	1,671	63	18	65
delphia	4.12	19	4.01	10	11,419	11	2,772	22	2,850	19	66	40
	3.77	25	3.19	42	5,865	58	1,554	63	1,841	59	12	66
er	2.53	53	3.43	39	7,041	44	2,788	21	2,053	56	29	59
ylkill	3.88	23	2.64	57	6,572	52	1,692	57	2,487	40	87	20
ler	3.49	35	3.85	16	6,934	48	1,987	50	1,800	61	28	60
erset	2.31	60	2.05	65	5,305	63	2,299	38	2,586	33	39	53
van	2.57	52	3.49	35	6,422	54	2,495	30	1,838	60	26	62
uehanna	4.20	18	3.56	31	6,870	49	1,634	59	1,932	57	45	51
a	4.74	10	4.01	9	10,280	17	2,171	42	2,562	35	65	41
n	4.10	21	3.68	27	6,445	53	1,574	62	1,749	62	35	56
ngo	4.21	17	5.65	2	15,650	3	3,716	11	2,769	23	81	26
ren	2.79	47	3.95	11	11,275	12	4,046	9	2,857	18	52	48
hington	2.38	58	3.02	47	9,977	18	4,196	8	3,308	5	136	8
ne	5.78	3	3.90	13	6,385	56	1,105	66	1,637	64	31	57
tmoreland	3.48	36	3.13	43	9,818	21	2,820	20	3,138	9	113	14
ming	4.60	13	5.79	1	10,760	15	2,337	37	1,858	58	27	61
k	3.58	30	3.69	25	8,775	30	2,454	31	2,380	48	74	34
State	$3.34		$3.57		$10,276		$3,074		$2,879		86	

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* Calculated from data supplied by the Department of Internal Affairs.

TABLE IV—MEASURES OF INDUSTRIAL DIVERSIFICATION—1948

COUNTIES	Percent of Total Industrial Employment in State's Leading Industries										Percent Population Employed in Industry
	Metals and Metal Products	Rank	Textiles and Apparel	Rank	Mine and Quarry Products	Rank	Food and Kindred Products	Rank	Other Industries	Rank	
Adams	3.9	55	14.1	36	3.5	29	27.4	3	51.1	12	14.5
Allegheny	67.0	5	1.1	54	4.4	26	8.2	17	19.3	51	17.7
Armstrong	7.9	51	—	—	39.4	11	12.9	7	39.8	18	15.4
Beaver	84.3	3	0.5	55	0.7	49	1.1	64	13.4	55	28.1
Bedford	—	—	20.0	32	47.8	6	4.3	34	27.9	36	5.8
Berks	33.6	25	40.1	9	0.4	53	6.3	24	19.6	50	24.6
Blair	6.5	53	6.8	42	1.8	37	7.4	20	77.5	2	15.2
Bradford	29.2	34	31.5	16	0.1	59	1.7	57	37.5	19	10.0
Bucks	27.9	35	34.2	14	1.7	38	3.4	42	32.7	31	15.2
Butler	55.3	11	2.8	50	14.9	20	3.3	43	23.7	42	13.7
Cambria	42.3	17	6.1	44	39.7	10	3.0	44	8.9	61	18.4
Cameron	92.8	1	0.2	58	0.2	58	0.1	67	6.7	63	34.3
Carbon	33.8	24	24.1	28	35.8	13	1.3	60	5.0	65	22.5
Centre	22.4	39	13.1	37	19.9	18	8.9	15	35.6	26	11.1
Chester	46.6	15	16.5	34	0.5	52	10.3	11	26.1	40	12.6
Clarion	1.0	59	—	—	53.5	4	2.9	47	42.6	16	8.7
Clearfield	9.4	47	5.2	45	45.7	7	3.0	45	36.7	23	13.8
Clinton	23.4	38	11.8	39	3.4	30	3.0	46	58.4	6	18.5
Columbia	32.8	28	42.5	7	12.8	22	8.8	16	3.1	66	23.8
Crawford	54.0	13	23.9	29	0.1	61	5.5	28	16.5	53	13.4
Cumberland	12.8	42	31.5	17	0.7	51	10.2	12	44.8	14	13.1
Dauphin	37.1	21	12.6	38	1.5	40	22.0	4	26.8	38	14.0
Delaware	47.5	14	14.4	35	0.3	56	2.1	52	35.7	25	13.9
Elk	54.2	12	—	—	9.7	23	1.8	55	34.3	29	22.3
Erie	73.0	4	0.5	56	0.1	61	4.7	32	21.7	46	25.2
Fayette	11.2	44	3.4	48	52.1	5	3.6	39	29.7	34	11.9
Forest	1.5	58	—	—	—	—	0.2	66	98.3	1	11.1
Franklin	41.5	18	29.2	22	1.1	45	16.4	5	11.8	58	13.8
Fulton	—	—	—	—	—	—	43.4	1	56.6	8	0.8
Greene	0.2	64	—	—	96.4	1	1.2	63	2.2	67	22.1
Huntingdon	2.1	57	22.1	30	19.2	19	7.6	19	49.0	13	11.6
Indiana	8.5	49	1.3	51	73.4	3	2.8	48	14.0	54	12.0
Jefferson	20.9	40	5.1	46	33.0	14	4.8	30	36.2	24	12.7
Juniata	—	—	42.5	6	2.1	35	28.9	2	26.5	39	7.5
Lackawanna	9.9	45	37.3	12	26.8	15	4.7	31	21.3	47	17.3
Lancaster	33.0	26	21.7	31	1.0	46	9.2	14	35.1	27	18.9
Lawrence	59.9	8	1.1	53	2.7	31	1.2	61	35.1	28	20.8
Lebanon	31.3	30	37.5	11	4.3	27	5.7	26	21.2	48	18.8
Lehigh	25.3	37	43.5	5	0.7	50	7.1	21	23.4	43	16.4
Luzerne	7.2	52	31.4	19	43.9	9	5.6	27	11.9	57	17.7
Lycoming	31.2	31	26.5	24	0.8	48	4.2	36	37.3	21	17.7
McKean	32.8	27	4.9	47	0.4	54	2.4	51	59.5	5	12.1
Mercer	88.5	2	0.4	57	1.4	43	2.0	53	7.7	62	22.5
Mifflin	31.1	32	49.1	2	2.7	32	8.1	18	9.0	60	20.4
Monroe	39.8	20	31.2	20	0.3	55	1.3	59	27.4	37	13.6
Montgomery	40.6	19	24.4	27	1.4	42	5.1	29	28.5	35	18.4
Montour	56.0	10	33.4	15	3.8	28	1.2	62	5.6	64	7.4
Northampton	44.3	16	29.1	23	2.0	36	2.7	49	21.9	45	26.0
Northumberland	12.0	43	40.7	8	23.7	16	6.8	22	16.8	52	17.4
Perry	25.9	36	39.0	10	0.1	60	11.9	9	23.1	44	4.8
Philadelphia	32.1	29	26.3	25	0.1	62	9.2	13	32.3	33	17.0
Pike	3.2	56	44.6	4	—	—	0.4	65	51.8	11	3.4
Potter	29.5	33	8.5	40	—	—	6.0	25	56.0	9	6.9
Schuylkill	5.2	54	34.8	13	44.1	8	3.5	40	12.4	56	16.6
Snyder	0.8	61	60.6	1	1.3	44	4.5	33	32.8	30	7.8
Somerset	0.9	60	8.3	41	75.1	2	3.9	37	11.8	59	10.6
Sullivan	0.5	63	6.3	43	23.4	17	12.8	8	57.0	7	7.6
Susquehanna	8.8	48	29.8	21	2.4	34	4.3	35	54.7	10	7.1
Tioga	16.1	41	3.2	49	4.6	25	3.8	38	72.3	3	10.9
Union	8.1	50	31.5	18	2.4	33	14.0	6	44.0	15	7.6
Venango	64.4	6	—	—	1.6	39	1.5	58	32.5	32	14.1
Warren	58.7	9	0.1	60	0.3	57	3.5	41	37.4	20	13.2
Washington	34.6	22	0.1	59	38.8	12	2.0	54	24.5	41	17.9
Wayne	9.8	46	45.0	3	1.4	41	1.8	56	42.0	17	9.0
Westmoreland	62.8	7	1.2	52	13.3	21	2.6	50	20.1	49	18.3
Wyoming	0.6	62	26.3	26	5.0	24	6.7	23	61.4	4	5.2
York	34.1	23	17.5	33	1.0	47	10.5	10	36.9	22	22.5
State	39.6		17.8		10.4		6.6		25.6		17.2

TABLE V—MEASURES OF DIVERSIFICATION—1948 (Continued)

COUNTIES	Percent Industrial Wage Earners Male	Rank	Change in Percent Male (1940-1948)	RETAIL TRADE* Percent Total Employment Mid-March	Rank	Percent Total Payrolls Jan.-March	Rank	MANUFACTURING* Percent Total Employment Mid-March	Rank	Percent Total Payrolls Jan.-March	Rank
ns	49.04	65	— 1.06	13.4	48	10.6	29	64.7	10	67.4	22
heny	89.40	14	— 2.09	16.9	17	12.2	17	48.3	42	53.8	38
trong	91.77	12	— 1.63	11.8	57	6.1	62	40.6	52	44.2	51
er	93.97	4	— 2.37	10.0	62	5.3	63	76.0	2	83.3	2
ord	77.58	29	—18.19	17.8	12	13.8	12	27.8	62	26.3	61
	65.16	47	— 0.74	12.2	55	8.9	50	64.2	12	69.6	15
	85.35	20	— 3.72	28.6	2	23.3	2	31.1	59	35.6	55
ford	70.24	41	— 8.85	15.9	25	11.0	26	60.0	23	68.0	21
s	61.98	52	— 0.75	13.5	46	10.5	30	61.6	19	69.3	18
r	93.04	8	— 3.82	17.0	15	10.7	28	51.2	38	60.7	31
ria	92.01	11	— 2.90	14.2	40	8.5	52	42.2	49	49.0	44
ron	45.51	67	+11.20	15.6	28	10.4	33	62.2	17	68.7	20
on	73.15	34	— 8.28	7.2	67	3.6	67	42.8	48	34.0	57
e	79.02	25	— 9.69	21.5	4	15.1	9	41.2	50	48.9	45
er	73.32	33	— 4.83	16.8	18	11.7	19	55.8	31	64.2	26
on	93.06	7	— 5.47	16.4	21	10.0	36	25.7	63	27.3	60
field	88.45	17	— 3.76	16.2	23	11.5	22	32.6	58	33.7	58
on	78.01	28	—12.86	16.5	20	11.4	24	63.3	15	72.5	10
nbia	72.33	36	+ 0.27	11.4	60	7.7	56	69.6	6	73.1	8
ford	76.01	31	— 4.18	16.7	19	12.2	16	61.8	18	69.9	14
erland	65.94	46	+ 2.00	20.0	9	15.3	8	46.6	44	47.7	48
hin	71.22	38	— 1.44	18.5	10	14.1	11	41.0	51	46.7	50
vare	86.97	19	— 0.37	14.9	34	9.8	38	59.0	24	68.7	19
	81.88	22	—11.44	7.9	65	4.6	64	69.6	5	74.3	6
	78.47	27	— 8.85	13.9	41	9.3	43	67.8	7	75.1	5
tte	87.14	18	— 9.06	18.0	11	11.0	27	21.9	64	18.1	64
t	96.54	2	— 3.46	7.5	66	3.6	66	77.7	1	84.3	1
klin	61.17	54	— 4.09	14.5	37	10.4	32	58.4	25	66.2	24
n	76.84	30	—23.16	12.5	54	9.3	45	37.9	55	25.9	63
e	99.70	1	— 0.09	9.1	64	4.3	65	3.7	67	2.3	67
ingdon	73.85	32	— 7.25	14.7	36	9.4	42	51.6	37	54.7	37
na	93.50	6	— 5.43	17.4	14	10.4	31	10.2	66	7.8	66
son	70.99	39	—21.01	12.9	53	7.5	59	45.2	46	48.0	46
ta	48.35	66	+ 9.40	12.0	56	11.6	21	64.0	13	64.2	27
awanna	61.54	53	— 8.95	14.9	33	11.6	20	38.5	54	35.2	56
aster	63.93	49	— 0.40	15.1	31	12.1	18	57.4	28	61.2	30
ence	84.65	21	— 3.34	14.9	32	9.0	47	61.2	21	69.4	16
non	60.49	55	— 4.60	13.9	42	9.2	46	64.7	11	72.5	9
h	56.73	61	— 4.64	14.8	35	11.3	25	56.7	29	59.4	33
ne	67.66	43	—12.48	13.7	44	8.9	49	33.0	57	27.7	59
ming	67.15	44	— 6.19	15.5	30	11.4	23	61.0	22	67.3	23
an	79.70	24	— 1.11	11.6	58	8.0	53	44.0	47	47.8	47
r	93.94	5	— 2.54	13.2	52	7.7	57	70.1	4	79.9	3
n	78.73	26	+ 7.54	14.3	39	9.9	37	66.7	8	73.3	7
oe	69.49	42	— 7.26	11.5	59	7.8	55	54.9	33	63.9	28
gomery	72.00	37	+ 0.98	13.3	49	10.2	35	63.6	14	70.3	12
our	70.92	40	— 7.78	16.2	22	9.3	44	56.1	30	66.2	25
hampton	73.12	35	— 0.62	10.2	61	6.5	61	72.9	3	78.8	4
humberland	63.12	50	—12.61	13.3	50	8.8	51	50.1	40	47.3	49
	54.59	62	— 0.97	21.3	5	17.4	5	49.9	41	53.4	41
delphia	66.06	45	— 1.25	15.8	26	12.6	15	47.2	43	50.3	43
	50.45	64	—25.25	17.4	13	13.5	13	30.7	61	38.5	53
er	59.69	58	—18.77	37.0	1	32.4	1	30.8	60	36.0	54
ylkill	62.42	51	— 9.69	13.3	51	9.0	48	35.1	56	26.2	62
er	53.42	63	— 0.51	16.0	24	12.7	14	58.1	26	63.3	29
rset	90.01	13	— 6.46	15.6	29	9.7	39	11.4	65	7.9	65
van	88.82	16	+ 0.88	9.8	63	6.9	60	57.6	27	53.7	39
uehanna	60.12	56	—21.72	21.0	7	18.6	4	51.7	36	51.9	42
a	81.11	23	— 8.98	15.7	27	9.6	40	62.4	16	72.0	11
n	58.52	59	—11.80	21.0	6	16.1	7	51.2	39	55.8	36
ngo	94.14	3	— 1.54	14.4	38	9.5	41	51.9	35	58.7	34
en	89.02	15	— 7.63	20.5	8	14.6	10	52.3	34	60.4	32
hington	92.25	9	— 2.34	13.4	47	7.6	58	39.6	53	41.7	52
ne	56.91	60	+10.12	17.0	16	16.3	6	55.4	32	56.9	35
moreland	92.19	10	— 1.10	13.7	43	7.9	54	61.5	20	70.2	13
ming	59.95	57	—39.57	23.5	3	18.7	3	46.0	45	53.7	40
	64.83	48	— 2.87	13.7	45	10.2	34	64.8	9	69.3	17
State	75.84		— 3.30	15.5		11.3		49.5		53.2	

Data from U. S. Bureau Old Age and Survivor's Insurance.
ercentages of Employment and Payrolls cover non-agricultural employment only.

TABLE VI—AGRICULTURE—1945

COUNTIES	Farm Population	Rank	Total No. of Farms	Rank	Land in Farms (Acres)	Rank	Average Size of Farms	Rank	Percent of Total Area in Farms	Rank	Arable Acreage (Acres)
Adams	13,258	21	3,149	20	264,929	22	84.1	39	78.7	7	181,091
Allegheny	14,264	19	3,092	22	163,128	45	52.8	67	34.9	51	91,519
Armstrong	13,780	20	3,458	17	263,835	23	76.3	47	62.5	24	141,034
Beaver	9,222	38	2,138	39	156,950	47	73.4	51	55.6	34	81,631
Bedford	14,684	17	3,362	18	418,413	6	124.5	7	64.2	21	163,926
Berks	21,170	5	4,863	6	374,891	13	77.1	46	67.8	17	271,603
Blair	8,809	41	2,084	41	152,685	48	73.3	52	45.0	43	102,216
Bradford	16,069	13	4,063	12	554,646	1	136.5	5	75.6	10	250,267
Bucks	17,899	9	4,069	11	267,449	21	65.7	61	67.7	18	188,658
Butler	17,024	11	4,105	10	308,909	17	75.3	49	60.8	28	157,113
Cambria	13,310	22	3,057	23	188,394	35	61.6	63	42.4	46	93,400
Cameron	718	66	162	66	17,681	66	109.1	14	6.9	67	4,373
Carbon	3,520	59	773	61	68,093	61	88.1	33	26.3	60	34,267
Centre	9,111	39	2,030	42	236,168	26	116.3	12	33.1	54	137,787
Chester	23,312	3	4,172	9	383,322	10	91.9	26	78.8	6	211,480
Clarion	9,493	37	2,280	35	208,790	29	91.6	27	54.5	37	113,328
Clearfield	13,134	23	3,128	21	203,200	30	65.0	62	27.8	59	100,105
Clinton	3,330	61	886	58	84,324	59	95.2	22	14.6	62	47,408
Columbia	8,676	42	2,201	36	191,155	33	86.8	37	61.7	26	119,855
Crawford	19,887	6	5,335	3	482,905	3	90.5	29	74.3	11	216,554
Cumberland	11,054	27	2,562	29	230,736	27	90.1	31	65.0	20	175,933
Dauphin	9,601	36	2,188	37	177,393	39	81.1	42	55.3	36	130,620
Delaware	3,466	60	669	62	45,088	64	67.4	60	38.1	48	21,295
Elk	3,764	58	843	59	62,263	62	73.9	50	12.0	64	26,940
Erie	18,290	8	4,600	7	381,613	12	83.0	40	73.4	13	187,739
Fayette	16,588	12	3,796	13	258,369	24	68.1	59	50.5	40	119,670
Forest	872	65	217	65	20,567	65	94.8	23	7.7	66	7,688
Franklin	15,737	14	3,560	14	336,255	15	94.5	24	69.7	15	231,867
Fulton	6,055	49	1,464	49	172,797	41	118.0	9	62.1	25	70,273
Greene	11,213	25	2,860	25	306,573	18	107.2	15	83.0	3	69,601
Huntingdon	7,663	45	1,765	47	254,974	25	144.5	4	44.5	45	112,653
Indiana	14,837	16	3,463	16	318,900	16	92.1	25	60.0	29	177,327
Jefferson	9,823	34	2,458	30	201,245	31	81.9	41	48.2	41	108,932
Juniata	5,773	50	1,354	53	137,256	52	101.4	19	55.4	35	76,587
Lackawanna	5,581	51	1,385	51	108,814	55	78.6	44	37.4	49	41,121
Lancaster	43,522	1	8,823	1	509,424	2	57.7	64	84.2	2	376,332
Lawrence	9,873	32	2,446	31	172,525	42	70.5	55	73.5	12	93,488
Lebanon	8,539	43	1,842	45	142,356	50	77.3	45	61.3	27	107,595
Lehigh	10,483	30	2,317	33	161,523	46	69.7	56	72.7	14	126,193
Luzerne	10,934	28	2,567	28	177,400	38	69.1	58	31.1	56	87,637
Lycoming	11,292	24	2,942	24	285,347	20	97.0	20	36.7	50	151,852
McKean	4,699	56	1,173	56	103,802	56	88.5	32	16.3	61	36,476
Mercer	17,239	10	4,353	8	351,036	14	80.6	43	80.5	5	192,899
Mifflin	5,320	52	1,179	55	124,261	53	105.4	17	45.0	42	69,215
Monroe	4,794	55	1,219	54	116,145	54	95.3	21	29.7	57	57,120
Montgomery	14,663	18	3,294	19	178,472	37	54.2	66	56.7	33	127,445
Montour	3,100	62	783	60	71,607	60	91.5	28	86.1	1	51,587
Northampton	9,848	33	2,308	34	164,801	44	71.4	54	68.9	16	130,670
Northumberland	8,966	40	2,118	40	182,454	36	86.1	38	62.8	23	119,378
Perry	7,236	46	1,788	46	189,193	34	105.8	16	53.7	39	104,521
Philadelphia	592	67	125	67	6,823	67	54.6	65	8.4	65	5,083
Pike	1,307	64	405	64	47,595	63	117.5	10	13.6	63	9,167
Potter	4,973	54	1,400	50	221,591	28	158.3	1	31.7	55	76,946
Schuylkill	10,091	31	2,184	38	166,197	43	76.1	48	33.2	53	105,970
Snyder	6,854	48	1,584	48	139,297	51	87.9	34	66.2	19	94,273
Somerset	15,682	15	3,466	15	404,634	8	116.7	11	58.3	31	188,560
Sullivan	2,487	63	649	63	85,191	58	131.3	6	27.8	58	27,877
Susquehanna	11,129	26	2,739	26	415,779	7	151.8	2	77.7	9	136,021
Tioga	10,594	29	2,727	27	399,930	9	146.7	3	54.3	38	178,608
Union	4,189	57	1,006	57	90,731	57	90.2	30	44.6	44	66,074
Venango	7,769	44	1,988	43	172,865	40	87.0	36	40.0	47	73,698
Warren	7,039	47	1,893	44	194,351	32	102.7	18	33.4	52	67,897
Washington	19,309	7	4,910	5	428,775	5	87.3	35	78.2	8	171,253
Wayne	9,615	35	2,439	32	303,126	19	124.3	8	63.7	22	93,412
Westmoreland	22,927	4	5,254	4	381,844	11	72.7	53	58.2	32	216,792
Wyoming	5,287	53	1,385	51	151,867	49	109.7	13	59.9	30	60,742
York	29,538	2	6,864	2	476,022	4	69.4	57	81.4	4	330,699
State	730,877		171,761		15,019,675		87.4		52.1		8,001,335

Data from U. S. Census of Agriculture.

TABLE VII—AGRICULTURE—1945 (Continued)

COUNTIES	Value of Farm Land and Buildings	Rank	Value of Land and Buildings, Per Farm	Rank	Value of Farm Products Sold, Traded, or Used	Rank	Value Per Farm of Products Used or Sold	Rank	Farms Having Electricity	Rank
as	$18,156,479	16	$5,766	20	$10,363,760	10	$3,327	16	2,548	17
eny	20,308,348	12	9,155	7	6,323,916	27	2,088	38	2,716	14
rong	11,583,668	34	3,350	62	3,777,317	41	1,125	63	1,699	33
r	11,841,997	31	5,539	24	3,644,905	44	1,723	53	1,704	32
rd	12,560,779	30	3,736	54	6,458 018	24	1,953	45	1,994	29
	31,990,729	6	6,578	12	18,582,106	4	3,866	8	4,026	5
	11,017,620	35	5,287	29	3,702,376	43	1,793	47	1,652	34
ord	17,019,648	18	4,189	43	12,144,363	7	3,100	18	3,420	10
	46,264,948	3	11,370	5	17,937,575	5	4,568	4	3,719	7
	19,778,969	13	4,818	33	7,335,208	22	1,816	46	2,994	13
ria	9,559,794	38	3,127	64	3,717,469	42	1,244	61	2,263	21
ron	560,418	67	3,459	59	151,181	67	945	66	109	65
n	4,241,890	59	5,488	27	1,863,953	58	2,433	33	588	59
e	9,513,709	39	4,687	35	5,437,605	31	2,731	26	1,257	43
eer	60,276,121	2	14,448	3	24,341,911	2	5,903	2	3,582	9
n	9,001,442	40	3,948	48	3,586,971	46	1,607	55	1,347	40
ield	8,698,692	42	2,781	67	2,884,665	54	935	67	2,131	23
n	3,860,270	60	4,357	39	1,688,881	60	2,003	43	549	61
bia	8,802,009	41	3,999	47	5,673,952	30	2,621	28	1,463	38
ford	22,521,002	11	4,221	40	9,407,349	11	1,790	48	4,514	3
erland	16,829,975	20	6,569	13	7,840,811	19	3,116	17	2,078	25
in	12,713,388	28	5,811	19	6,454,981	25	3,014	21	1,594	35
are	14,653,600	23	21,904	2	2,866,500	53	4,403	5	619	56
k	3,545,255	61	4,206	41	1,056,930	64	1,284	60	594	58
	26,344,676	8	5,727	22	11,838,403	8	2,626	27	3,901	6
te	15,458,365	21	4,072	46	4,025,881	36	1,079	65	2,648	16
rt	692,305	66	3,190	63	247,627	66	1,168	62	80	67
klin	22,582,766	10	6,343	15	12,947,614	6	3,676	9	2,700	15
n	4,341,925	58	2,966	66	2,529,690	56	1,763	50	617	57
e	11,753,975	32	4,110	45	2,976,967	52	1,097	64	637	54
ingdon	6,539,403	51	3,705	57	3,512,868	47	2,015	41	1,149	46
na	13,270,233	26	3,832	53	5,032,045	33	1,494	57	2,421	19
son	8,454,683	43	3,440	60	3,644,223	45	1,503	56	1,469	37
ta	5,572,357	55	4,115	44	3,449,596	49	2,569	30	742	52
wanna	8,383,837	44	6,053	17	4,182,361	35	3,060	19	1,215	44
ster	96,615,299	1	10,950	6	50,609,473	1	5,767	3	6,625	1
ence	13,526,335	24	5,530	25	4,971,788	34	2,074	40	2,043	27
non	13,306,280	25	7,224	10	7,618,602	20	4,209	6	1,444	39
h	18,065,155	17	7,797	8	8,993,660	13	3,900	7	1,956	31
ne	15,051,264	22	5,863	18	5,410,794	32	2,200	36	2,025	28
ning	13,204,171	27	4,488	37	5,982,498	29	2,085	39	2,068	26
an	5,123,939	57	4,368	38	1,688,660	61	1,485	58	834	51
r	18,237,013	15	4,190	42	7,311,868	23	1,736	52	3,655	8
	6,788,500	49	5,758	21	3,901,639	40	3,352	15	582	60
oe	7,732,670	46	6,343	16	2,430,461	57	2,012	42	934	49
gomery	43,174,144	5	13,107	4	11,100,319	9	3,481	12	3,060	11
our	2,924,575	63	3,735	55	1,742,579	59	2,320	34	411	63
ampton	16,882,535	19	7,315	9	8,172,307	17	3,600	10	2,102	24
umberland	8,347,041	45	3,941	49	6,204,093	28	2,990	22	1,295	41
	6,628,765	50	3,707	56	4,009,703	38	2,282	35	1,068	48
delphia	3,366,600	62	26,933	1	1,615,807	62	12,926	1	108	66
	2,737,999	64	6,760	11	769,857	65	1,959	44	310	64
r	5,403,003	56	3,859	52	3,492,692	48	2,618	29	857	50
lkill	10,738,303	37	4,917	32	6,377,177	26	2,952	24	1,499	36
r	6,170,547	52	3,896	51	3,962,341	39	2,521	32	702	53
rset	19,075,157	14	5,504	26	8,654,166	15	2,547	31	2,482	18
an	2,219,659	65	3,420	61	1,349,055	63	2,176	37	418	62
ehanna	10,782,375	36	3,937	50	9,252,006	12	3,523	11	2,254	22
	12,604,070	29	4,622	36	7,557,479	21	2,688	25	2,276	20
	5,711,993	53	5,678	23	2,977,628	51	2,981	23	627	55
ngo	7,231,830	48	3,638	58	2,645,536	55	1,383	59	1,284	42
en	5,657,777	54	2,989	65	3,274,590	50	1,778	49	1,103	47
ington	24,200,589	9	4,929	31	8,401,183	16	1,752	51	3,023	12
ne	11,743,416	33	4,815	34	8,155,857	18	3,407	13	1,988	30
moreland	27,412,865	7	5,218	30	8,800,824	14	1,723	54	4,132	4
ning	7,331,255	47	5,293	28	4,025,268	37	3,033	20	1,168	45
	43,883,141	4	6,393	14	23,056,785	3	3,384	14	5,561	2
State	$1,008,573,540		$5,872		$456,146,673		$2,712		126,633	

ata from U. S. Census of Agriculture.

TABLE VIII—PUBLICLY OWNED LAND—1948

COUNTIES	State Owned Acres	Rank	Federally Owned Acres	County and Municipally Owned Forests and Parks*	Rank	Total Publicly Owned Land	Rank	Percent of Total Area in Publicly Owned Land
Adams	20,992	30	2,479	574	29	24,045	33	7.1
Allegheny	1,312	62	—	7.014	10	8,326	49	1.7
Armstrong	2,417	56	—	56	46	2,473	63	0.6
Beaver	6,461	49	—	1,007	23	7,468	51	2.6
Bedford	70,679	12	—	70	45	70,749	15	10.8
Berks	14,223	38	522	9,426	6	24,171	32	4.4
Blair	18,237	34	—	16,064	2	34,301	26	10.1
Bradford	37,700	19	—	357	36	38,057	25	5.1
Bucks	4,700	51	—	190	40	4,890	53	1.2
Butler	2,674	54	—	136	42	2,810	60	0.6
Cambria	18,580	33	—	2,147	15	20,727	36	4.7
Cameron	132,188	6	—	143	41	132,331	9	51.5
Carbon	27,401	28	—	12,259	4	39,660	22	15.3
Centre	174,168	4	—	256	39	174,424	5	24.4
Chester	1,889	59	326	528	31	2,743	61	0.6
Clarion	16,701	35	—	—	—	16,701	39	4.4
Clearfield	109,814	8	—	3,173	13	112,987	11	15.4
Clinton	247,123	2	—	13,447	3	260,570	2	45.1
Columbia	13,461	40	—	36	50	13,497	42	4.3
Crawford	29,486	26	—	788	25	30,274	29	4.6
Cumberland	35,671	20	—	3,565	11	39,236	23	11.1
Dauphin	31,086	24	—	29,638	1	60,724	16	17.3
Delaware	10	66	—	539	30	549	66	0.4
Elk	126,672	7	113,067	3	55	239,742	3	46.3
Erie	10,988	44	—	488	33	11,476	46	2.2
Fayette	12,773	41	2	18	52	12,793	43	2.5
Forest	8,842	48	111,304	—	—	120,146	10	44.3
Franklin	44,904	16	—	676	27	45,580	19	9.4
Fulton	44,935	15	—	—	—	44,935	20	16.1
Greene	1,068	63	—	—	—	1,068	65	0.3
Huntingdon	82,569	10	1,760	1,258	20	85,587	13	14.9
Indiana	4,516	52	—	2	57	4,518	55	0.9
Jefferson	32,998	21	—	33	51	33,031	27	7.9
Juniata	16,343	36	—	—	—	16,343	40	6.6
Lackawanna	9,591	46	—	53	47	9,644	47	3.3
Lancaster	5,021	50	—	469	34	5,490	52	0.9
Lawrence	2,024	57	—	1,143	21	3,167	58	1.4
Lebanon	18,644	32	—	3,275	12	21,919	34	9.5
Lehigh	2,483	55	—	2,199	14	4,682	54	2.1
Luzerne	38,290	18	—	388	35	38,678	24	6.7
Lycoming	189,997	3	—	11,704	5	201,701	4	25.8
McKean	23,505	29	126,439	8,183	8	158,127	6	24.8
Mercer	966	64	—	318	37	1,284	64	0.3
Mifflin	55,477	14	—	1,282	19	56,759	17	20.6
Monroe	20,494	31	—	647	28	21,141	35	5.3
Montgomery	1,960	58	—	1,372	18	3,332	57	1.0
Montour	227	65	—	3	55	230	67	0.3
Northampton	1,441	60	—	1,038	22	2,479	62	1.0
Northumberland	9,385	47	—	45	48	9,430	48	3.1
Perry	41,637	17	—	1	59	41,638	21	11.8
Philadelphia	—	67	2	7,525	9	7,527	50	8.7
Pike	72,119	11	—	—	—	72,119	14	20.2
Potter	269,322	1	—	772	26	270,094	1	38.6
Schuylkill	9,642	45	—	8,449	7	18,091	37	3.6
Snyder	30,220	25	—	—	—	30,220	30	14.4
Somerset	31,904	23	—	1	59	31,905	28	4.6
Sullivan	86,338	9	—	5	54	86,343	12	28.2
Susquehanna	11,577	43	—	2	57	11,579	45	2.2
Tioga	136,142	5	—	998	24	137,140	8	18.6
Union	56,074	13	—	40	49	56,114	18	27.6
Venango	16,242	37	—	1,496	16	17,738	38	4.1
Warren	32,332	22	118,777	82	44	151,191	7	25.7
Washington	2,976	53	—	518	32	3,494	56	0.6
Wayne	12,291	42	—	8	53	12,299	44	2.5
Westmoreland	13,597	39	—	292	38	13,889	41	2.1
Wyoming	29,271	27	—	86	43	29,357	31	11.4
York	1,324	61	—	1,488	17	2,812	59	0.5
State	2,636,694		474,678	157,773		3,268,545		11.3

* 12-31-47 Excluding Playgrounds.

TABLE IX—FOREST LAND AND HIGHWAYS

COUNTIES	Total Area Sq. Mi.	Rank	Percent of Total Area Forested	Rank	Total Public Road Mileage	Rank	State Highway Mileage	Rank	County Twp. and Municipal Highway Mileage	Rank	Miles of Public Roads Per Sq. Mile of Area	Rank
ms	526	45	30.5	49	1,203	43	548	38	655	44	2.29	33
gheny	745	30	28.3	53	4,085	1	944	9	3,141	1	5.48	3
rstrong	668	34	46.3	39	1,796	23	713	24	1,083	20	2.69	20
ver	447	51	36.5	45	1,408	32	605	29	803	34	3.15	11
ford	1,019	10	59.1	24	1,638	26	801	17	837	30	1.61	51
ks	864	18	29.8	52	2,681	5	1,028	7	1,653	6	3.10	12
r	530	44	58.6	25	936	52	427	47	509	52	1.77	45
lford	1,156	2	46.2	40	2,494	7	1,040	6	1,454	9	2.16	37
ks	625	36	18.5	61	2,036	16	935	12	1,101	19	3.26	7
er	795	25	30.7	48	1,982	17	786	19	1,196	16	2.49	25
bria	695	31	60.9	21	1,424	30	594	30	830	31	2.05	39
eron	401	57	92.8	1	205	67	98	67	107	67	0.51	67
bon	406	55	78.8	9	607	61	258	63	349	57	1.50	54
re	1,116	5	71.2	14	1,117	46	579	31	538	49	1.00	62
ster	762	27	17.7	62	2,422	8	1,118	4	1,304	11	3.18	10
ion	600	38	50.4	34	1,421	31	561	35	860	29	2.37	30
rfield	1,144	4	72.1	13	1,866	19	814	15	1,052	22	1.63	50
ton	902	15	86.6	6	630	57	303	58	327	59	0.70	66
mbia	488	47	47.4	37	1,312	36	556	37	756	39	2.69	21
wford	1,037	8	33.9	46	2,277	10	962	8	1,315	10	2.20	35
berland	555	41	30.4	50	1,280	38	565	34	715	40	2.31	31
phin	548	43	39.1	43	1,304	37	512	40	792	35	2.38	29
ware	191	65	16.3	65	1,185	44	418	50	767	37	6.20	2
	809	23	88.5	4	611	60	275	60	336	58	0.76	65
	818	22	30.3	51	2,099	13	798	18	1,301	12	2.57	24
ette	806	24	57.6	27	1,979	18	748	22	1,231	14	2.46	26
est	423	54	90.6	2	375	66	190	64	185	66	0.89	63
nklin	754	29	39.0	44	1,265	40	575	32	690	42	1.68	47
ton	435	52	58.4	26	624	58	332	55	292	61	1.43	55
ne	579	39	24.5	57	1,500	27	621	28	879	28	2.59	23
tingdon	895	17	72.2	12	1,255	41	663	27	592	46	1.40	56
iana	831	21	46.9	38	2,033	15	904	13	1,129	17	2.45	27
erson	652	35	55.6	28	1,358	35	574	33	784	36	2.08	38
iata	387	58	54.5	31	709	56	330	56	379	56	1.83	43
kawanna	458	50	65.6	18	1,242	42	425	48	817	32	2.71	18
caster	974	12	17.6	63	3,106	2	1,236	1	1,870	3	3.19	9
rence	366	60	17.1	64	1,033	48	406	51	627	45	2.82	17
anon	362	61	31.6	47	962	51	401	52	561	48	2.66	22
igh	348	62	15.8	66	1,494	28	511	43	983	24	4.29	5
erne	902	16	68.4	16	2,074	14	782	20	1,292	13	2.30	32
oming	1,223	1	67.4	17	1,831	22	816	14	1,015	23	1.50	53
Kean	997	11	87.1	5	822	53	421	49	401	54	0.82	64
cer	681	33	22.3	59	1,839	20	723	23	1,116	18	2.70	19
flin	431	53	63.4	19	545	63	265	61	280	62	1.26	58
nroe	618	37	77.8	10	1,018	49	491	45	527	51	1.65	48
ntgomery	497	46	20.4	60	2,317	9	809	16	1,508	7	4.66	4
ntour	131	67	27.8	54	378	65	170	65	208	65	2.89	16
thampton	377	59	25 5	56	1,441	29	491	44	950	26	3.82	6
thumberland	470	49	40.5	42	1,370	34	557	36	813	33	2.91	14
ry	553	42	59.2	23	972	50	439	46	533	50	1.76	46
ladelphia	135	66	8.1	67	2,179	11	155	66	2,024	2	16.14	1
e	558	40	88.8	3	613	59	315	57	298	60	1.10	60
ter	1,092	6	81.2	8	1,094	47	519	39	575	47	1.00	61
uylkill	784	26	68.5	15	1,747	25	664	26	1,083	21	2.23	34
der	329	63	47.7	36	789	54	347	54	412	53	2.40	28
merset	1,085	7	53.7	32	2,162	12	936	11	1,226	15	1.99	40
llivan	479	48	81.7	7	555	62	289	59	266	63	1.16	59
quehanna	841	20	49.9	35	1,835	21	941	10	894	27	2.18	36
ga	1,150	3	55.4	29	1,757	24	778	21	979	25	1.53	52
ion	318	64	53.4	33	518	64	264	62	254	64	1.63	49
nango	682	32	54.8	30	1,270	39	512	41	758	38	1.86	41
rren	918	13	76.2	11	1,167	45	511	42	656	43	1.27	57
shington	860	19	23 5	58	2,534	6	1,054	5	1,480	8	2.95	13
yne	760	28	60.4	22	1,407	33	712	25	695	41	1.85	42
stmoreland	1,028	9	46.0	41	2,981	3	1,228	2	1,753	5	2.90	15
oming	404	56	62.0	20	740	55	361	53	379	55	1.83	44
rk	914	14	27.1	55	2,956	4	1,194	3	1,762	4	3.23	8
State	45,334		52.1 (average)		99,859		40,893*		58,966*		2.20	

* County totals do not exactly equal state totals because fractions of miles were eliminated.

Forest data from Department of Forests and Waters. Highway data from Department of Highways.

TABLE X—MOTOR VEHICLES

COUNTIES	Passenger Cars Registered 1948	Rank	Commercial Vehicles Registered 1948	Rank	Population Per Passenger Car 1948	Populatio Per Commerci Vehicle 1948
Adams	13,334	41	2,916	42	3.4	15.7
Allegheny	260,899	2	47,425	2	5.6	30.9
Armstrong	19,436	34	3,633	36	4.3	22.8
Beaver	34,941	21	6,039	23	4.9	28.3
Bedford	10,706	46	2,952	41	3.7	13.4
Berks	65,279	6	12,413	8	3.8	19.9
Blair	29,816	22	6,136	22	5.1	24.8
Bradford	13,269	42	2,872	43	3.8	17.7
Bucks	41,261	17	7,777	20	3.0	16.0
Butler	26,320	26	5,569	25	3.5	16.4
Cambria	39,089	19	8,239	18	5.9	27.9
Cameron	1,716	66	334	67	4.2	21.6
Carbon	13,486	40	2,182	49	4.7	29.2
Centre	15,462	37	3,277	38	3.5	16.6
Chester	39,719	18	8,608	17	3.6	16.6
Clarion	11,922	44	2,661	44	3.2	14.5
Clearfield	19,588	33	5,001	26	4.5	17.5
Clinton	8,839	52	1,808	54	4.2	20.6
Columbia	14,984	39	3,572	37	3.5	14.8
Crawford	22,259	29	3,976	34	3.7	20.5
Cumberland	26,928	24	4,460	29	3.0	18.4
Dauphin	43,823	13	13,143	6	4.7	15.5
Delaware	90,079	4	9,343	15	4.3	41.9
Elk	8,013	53	1,575	56	4.3	21.7
Erie	56,115	10	9,853	12	3.7	21.2
Fayette	37,808	20	9,356	14	5.2	20.8
Forest	1,455	67	330	66	3.6	15.5
Franklin	21,412	31	4,029	33	3.5	18.6
Fulton	2,801	63	642	64	4.3	18.7
Greene	10,272	48	2,094	51	4.6	22.6
Huntingdon	10,598	47	1,997	53	4.1	21.8
Indiana	19,089	35	4,280	32	4.2	18.6
Jefferson	13,203	43	2,982	40	4.0	17.5
Juniata	4,734	60	933	61	3.4	17.4
Lackawanna	42,477	15	10,254	11	6.1	25.2
Lancaster	63,954	8	13,262	5	3.6	17.1
Lawrence	26,016	27	4,654	28	3.8	21.2
Lebanon	22,064	30	4,302	31	3.9	20.0
Lehigh	41,869	16	9,497	13	4.7	20.6
Luzerne	72,011	5	15,185	3	5.9	28.1
Lycoming	26,776	25	5,639	24	3.7	17.7
McKean	15,201	38	3,761	35	3.8	15.3
Mercer	28,231	23	4,399	30	3.9	24.8
Mifflin	9,816	51	2,182	49	4.4	20.0
Monroe	10,272	48	2,279	46	3.1	14.2
Montgomery	93,552	3	14,797	4	3.5	22.4
Montour	3,127	62	858	62	5.1	18.4
Northampton	48,471	11	8,173	19	3.8	22.3
Northumberland	24,930	28	6,915	21	4.8	17.3
Perry	7,275	56	1,368	58	3.3	17.4
Philadelphia	276,665	1	62,080	1	7.8	34.7
Pike	2,693	64	682	63	2.8	10.9
Potter	4,430	61	1,183	59	3.8	14.1
Schuylkill	44,388	12	10,878	10	4.9	20 1
Snyder	6,254	58	1,456	57	3.6	15.3
Somerset	19,849	32	4,781	27	4.2	17.6
Sullivan	1,759	65	589	65	4.2	12.4
Susquehanna	7,688	54	2,041	52	4.1	15.5
Tioga	9,968	50	2,367	45	3.4	14.4
Union	6,667	57	1,126	60	3.2	18.8
Venango	16,417	36	3,092	39	3.9	20.9
Warren	11,314	45	2,230	48	3.5	17.6
Washington	43,324	14	9,180	16	4.9	23.3
Wayne	7,579	55	2,248	47	3.7	12.6
Westmoreland	65,214	7	12,475	7	4.7	24.8
Wyoming	5,038	59	1,628	55	3.1	9.7
York	57,678	9	11,899	9	3.5	17.1
State	2,171,622		439,876		4.8	23.8

Data from Bureau of Motor Vehicles, Department of Revenue.

TABLE XI—PROPERTY VALUES, TAXES, BANK DEPOSITS

COUNTIES	Market Value of Taxable Real Estate[1]	Rank	Total Taxes Collected[2] 1948	Rank	Bank Deposits of Individuals, Partnerships and Corporations[3] (June 30, 1949)			
					Demand	Rank	Time	Rank
ms	$75,628,310	41	$715,775	49	$12,141,000	44	$18,472,000	38
gheny	3,923,140,384	2	28,810,216	2	1,454,585,000	2	560,369,000	2
nstrong	127,979,015	33	1,644,394	34	21,756,000	35	26,119,000	27
ver	424,597,545	11	5,610,357	16	43,194,000	19	42,088,000	21
ford	44,077,740	50	617,146	51	8,191,000	52	10,546,000	48
ks	566,695,145	7	9,031,115	6	109,720,000	5	87,086,000	9
ir	183,064,226	25	3,496,354	22	37,039,000	23	17,842,000	41
dford	65,006,354	44	1,095,631	41	11,201,000	46	17,597,000	42
ks	320,599,576	19	3,663,973	20	37,995,000	22	44,193,000	20
ler	191,662,734	24	2,281,188	28	36,245,000	24	27,738,000	25
nbria	362,212,582	18	6,243,876	12	44,323,000	18	45,186,000	19
neron	11,363,455	64	166,236	64	2,752,000	63	2,549,000	64
bon	82,412,640	39	1,715,326	32	8,661,000	51	26,957,000	26
tre	72,405,304	42	982,293	43	19,554,000	37	13,790,000	46
ster	384,753,829	17	4,166,569	19	49,559,000	16	58,483,000	13
rion	41,194,044	53	579,021	55	15,320,000	42	17,991,000	39
arfield	70,462,272	43	1,206,820	39	23,362,000	34	22,435,000	32
nton	43,796,877	51	617,400	50	10,045,000	47	9,519,000	50
umbia	83,737,283	38	1,199,845	40	15,559,000	41	24,979,000	29
wford	145,448,259	29	2,137,613	30	24,905,000	33	20,723,000	37
nberland	176,515,794	26	2,297,385	27	30,448,000	30	21,156,000	36
uphin	410,327,419	14	5,889,496	13	97,489,000	6	55,402,000	15
aware	1,175.548,715	4	15,306,672	3	77,045,000	10	55,158,000	16
	37.142,289	55	615,649	52	12,592,000	43	8,795,000	52
e	455,862,066	9	7,797,527	8	96,871,000	7	57,566,000	14
yette	208,397,019	21	3,565,087	21	45,522,000	17	21,704,000	34
rest	6,591,800	67	82,382	67	1,092,000	67	917,000	67
nklin	130,077,142	32	1,379,647	38	35,271,000	26	24,600,000	30
lton	8,730,524	65	109,402	66	1,665,000	65	2,989,000	63
ene	118,595,029	34	1,526,827	35	8,678,000	50	4,899,000	61
ntingdon	53,500,870	48	614,445	53	9,476,000	49	8,197,000	54
liana	109,943,466	36	1,502,204	36	19,400,000	38	21,273,000	35
ferson	59,065,866	46	912,900	45	18,085,000	39	12,002,000	47
niata	15,278,091	63	220,709	63	4,411,000	59	5,479,000	59
ckawanna	396,273,485	16	7,379,616	9	72,831,000	11	105,895,000	5
ncaster	552,869,482	8	5,879,165	14	111,062,000	4	77,763,000	11
wrence	191,803,634	23	3,043,858	24	32,790,000	29	25,645,000	28
banon	172,355,478	27	2,022,812	31	25,573,000	32	31,093,000	23
high	422,126,392	12	6,250,928	11	66,915,000	13	66,015,000	12
zerne	724,036,133	5	13,589,207	4	86,253,000	9	184,388,000	3
coming	144,638,681	31	2,494,573	26	33,586,000	28	28,825,000	24
Kean	155,701,885	28	2,174,654	29	35,376,000	25	17,985,000	40
rcer	196,681,753	22	3,347,348	23	38,840,000	21	51,258,000	18
fflin	64,421,210	45	914,927	44	11,463,000	45	10,334,000	49
nroe	78,590,628	40	904,714	46	9,923,000	48	14,211,000	45
ntgomery	1,175,790,719	3	13,378,528	5	125,709,000	3	99,426,000	6
ntour	15,812,379	62	245,705	62	2,981,000	62	4,921,000	60
rthampton	444,373,063	10	7,101,797	10	57,917,000	15	98,874,000	7
rthumberland	144,644,315	30	2,625,635	25	28,942,000	31	38,764,000	22
rry	28,781,764	58	305,582	61	5,021,000	57	7,516,000	55
iladelphia	5,021,890,986	1	117,215,439	1	1,961,601,000	1	1,319,396,000	1
ke	36,061,266	56	305,859	60	1,997,000	64	2,441,000	65
tter	18,037,600	61	306,985	59	3,850,000	60	4,016,000	62
huylkill	296,204,126	20	4,870,445	17	42,976,000	20	84,430,000	10
yder	24,997,951	59	327,118	57	5,460,000	56	6,194,000	58
merset	101,989,695	37	1,484,913	37	20,749,000	36	21,801,000	33
llivan	8,288,764	66	135,077	65	1,247,000	66	1,867,000	66
squehanna	39,696,144	54	766,743	47	4,441,000	58	8,302,000	53
oga	42,001,680	52	750,227	48	7,813,000	53	8,910,000	51
ion	29,861,707	57	342,246	56	6,586,000	54	6,658,000	57
nango	110,800,776	35	1,666,473	33	35,244,000	27	23,324,000	31
arren	58,798,806	47	1,030,726	42	17,846,000	40	17,370,000	43
ashington	410,690,032	13	5.828,387	15	64,699,000	14	52,871,000	17
ayne	48,393,772	49	595,982	54	5,669,000	55	16,854,000	44
estmoreland	599,271,364	6	7,812,253	7	89,621,000	8	89,125,000	8
yoming	24,887,241	60	324,083	58	3,756,000	61	6,659,000	56
rk	398,760,039	15	4,628,248	18	72,792,000	12	115,967,000	4
State	$22,365,346,614		$387,851,733		$5,535,681,000		$4,043,927.000	

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[1] State Tax Equalization Board 1948. [2] Internal Affairs. Does not include taxes under Act No. 481. [3] Board Governors, Federal Reserve Bank.

TABLE XII—EDUCATION AND PUBLIC ASSISTANCE*

COUNTIES	State Grant for Education (1947-1948 Year)	Rank	State Grant Per Pupil	Rank	Education Cost Per Pupil	Rank	Average Number of Persons on Public Assistance	Rank	Percent of County Population on Public Assistance	Rank	State Expenditures for Public Assistance
Adams	$594,460	50	$90.67	18	$156.91	42	1,196	50	2.6	39	$422,637
Allegheny	7,731,784	1	42.51	65	191.88	5	47,035	2	3.2	27	18,584,687
Armstrong	1,167,399	30	77.75	39	161.52	33	2,070	31	2.5	42	645,204
Beaver	2,051,069	15	71.96	47	172.53	23	2,231	28	1.3	62	778,259
Bedford	805,924	40	92.87	16	137.02	61	2,011	32	5.1	5	633,278
Berks	2,205,231	12	60.71	59	179.01	14	3,935	15	1.6	57	1,564,616
Blair	1,676,058	18	76.81	41	149.25	46	4,441	12	2.9	31	1,576,296
Bradford	997,962	33	104.08	5	175.26	18	2,951	23	5.8	1	1,070,766
Bucks	1,279,625	27	66.88	53	171.94	25	1,274	49	1.0	65	503,787
Butler	1,143,710	31	70.47	49	158.08	41	1,900	34	2.1	51	684,563
Cambria	2,406,046	8	95.06	13	162.48	34	6,455	7	2.8	35	2,111,114
Cameron	118,236	66	94.97	14	180.72	11	123	67	1.7	54	58,437
Carbon	703,901	46	80.99	35	175.42	17	1,336	47	2.1	50	492,208
Centre	938,105	35	87.01	24	145.80	49	1,920	33	3.5	23	639,418
Chester	1,469,227	22	63.67	55	177.66	15	3,278	20	2.3	45	1,225,417
Clarion	766,685	41	103.30	6	147.87	48	1,571	42	4.0	15	481,182
Clearfield	1,577,387	19	93.11	15	134.88	65	3,690	17	4.2	13	1,193,308
Clinton	528,164	52	86.94	26	142.89	52	1,578	41	4.2	12	541,610
Columbia	721,626	43	76.76	42	149.91	43	1,440	45	2.8	34	527,792
Crawford	568,110	51	42.29	66	168.93	28	2,119	30	2.6	40	776,901
Cumberland	1,039,464	32	69.88	50	138.97	55	1,294	48	1.6	58	465,372
Dauphin	1,566,573	20	60.07	60	170.41	26	5,079	9	2.5	43	1,862,501
Delaware	2,423,578	7	50.96	64	208.39	3	6,114	8	1.6	59	2,263,213
Elk	432,449	54	92.56	17	161.77	35	584	61	1.7	52	208,148
Erie	1,952,694	16	54.53	62	179.68	13	3,558	19	1.7	53	1,449,213
Fayette	3,128,845	5	86.09	28	149.38	45	9,781	5	5.0	6	3,114,774
Forest	118,839	65	117.31	2	167.54	30	136	66	2.6	41	49,921
Franklin	957,773	34	76.35	43	130.88	66	1,619	40	2.2	47	540,699
Fulton	239,860	62	102.59	7	137.88	59	438	62	3.7	21	135,311
Greene	713,137	45	78.05	37	160.17	38	1,400	46	3.0	30	484,579
Huntingdon	715,022	44	87.78	21	138.23	57	1,775	39	4.0	16	593,789
Indiana	1,272,701	28	80.96	36	136.26	63	3,953	14	5.0	7	1,300,315
Jefferson	839,395	38	83.70	30	136.11	64	2,421	26	4.6	8	862,298
Juniata	282,338	60	97.36	12	137.51	60	627	58	3.9	18	197,230
Lackawanna	2,284,850	11	61.95	57	169.62	27	11,740	4	4.5	10	4,501,891
Lancaster	2,189,172	14	61.62	58	144.28	51	2,981	21	1.3	61	1,172,549
Lawrence	1,240,748	29	71.64	48	159.22	40	2,150	29	2.2	46	820,589
Lebanon	809,460	39	63.29	56	141.36	54	927	53	1.1	64	360,184
Lehigh	1,439,833	24	56.89	61	164.36	31	1,864	35	0.95	66	776,306
Luzerne	3,972,190	3	67.37	52	181.48	8	14,204	3	3.3	26	5,267,785
Lycoming	1,318,934	26	86.27	27	175.21	19	2,727	25	2.7	36	1,065,795
McKean	872,140	36	82.18	32	189.68	6	1,542	44	2.7	37	602,087
Mercer	1,398,683	25	76.03	44	163.40	32	2,331	27	2.1	48	885,192
Mifflin	652,551	47	77.89	38	138.71	56	1,781	37	4.1	14	600,390
Monroe	418,943	56	81.95	33	179.99	12	1,006	51	3.1	29	402,760
Montgomery	2,346,586	10	53.94	63	215.60	2	3,703	16	1.1	63	1,399,556
Montour	204,545	63	86.97	25	145.50	50	626	59	4.0	17	228,491
Northampton	1,800,408	17	64.46	54	174.36	21	2,960	22	1.6	55	1,126,131
Northumberland	1,540,455	21	85.80	29	161.40	36	4,212	13	3.5	22	1,549,413
Perry	419,640	55	87.68	22	141.84	53	625	60	2.6	38	195,859
Philadelphia	5,942,975	2	28.55	67	180.37	10	81,956	1	3.8	19	31,967,568
Pike	90,595	67	99.88	10	257.10	1	173	65	2.3	44	84,396
Potter	374,169	57	114.64	3	185.34	7	953	52	5.7	2	340,023
Schuylkill	2,387,359	9	82.70	31	174.93	20	7,466	6	3.4	25	2,762,398
Snyder	349,005	58	89.79	20	138.09	58	771	56	3.5	24	292,419
Somerset	1,459,153	23	87.58	23	126.84	67	3,575	18	4.2	11	1,177,668
Sullivan	153,058	64	124.34	1	197.45	4	272	64	3.7	20	109,230
Susquehanna	595,106	49	101.07	8	171.96	24	1,778	38	5.6	3	663,191
Tioga	724,798	42	108.02	4	168.03	29	1,567	43	4.6	9	611,940
Union	254,233	61	77.20	40	136.89	62	663	57	3.1	28	238,570
Venango	848,177	37	81.63	34	160.85	37	1,849	36	2.9	32	666,901
Warren	634,536	48	90.67	19	172.67	22	354	63	0.9	67	133,928
Washington	2,579,500	6	69.63	51	149.89	44	4,544	11	2.1	49	1,633,936
Wayne	445,621	53	98.63	11	181.31	9	812	55	2.9	33	334,610
Westmoreland	3,856,611	4	74.65	45	159.25	39	4,996	10	1.6	56	1,675,089
Wyoming	317,358	59	99.96	9	177.46	16	878	54	5.5	4	333,258
York	2,193,577	13	72.99	46	149.17	47	2,891	24	1.4	60	1,037,521
State	$91,318,346		$62.51		$193.28		302,210		2.9		$113,020,467

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* Basic data from Departments of Public Instruction and Public Assistance 1948.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

*1—Preliminary Report. 682 pages. 152 charts, December, 1934

*10—Drainage Basin Study. 3 vols., 611 pages, 1937.

15—Recent Industrial Trends and New Employment Opportunities in Pennsylvania.

16—Retail Trade in Pennsylvania, 1946.

17—Industrial Utility of Water in Pennsylvania. Chemical Character of Surface Water, 1944 to 1946. 1947

18—The Pennsylvania Zoning Primer (Revised), 1948.

19—Local Powers for Community Development, 1948.

20—A Pennsylvania Recreation Manual, 1949.

21—Planning and Zoning Powers and Procedures in Pennsylvania, 1949. Vol. 1. (Townships of the Second Class, Counties, Regions.)

22—Planning and Zoning Powers and Procedures in Pennsylvania, 1949. Vol. 2. (Cities, Boroughs, First Class Townships.)

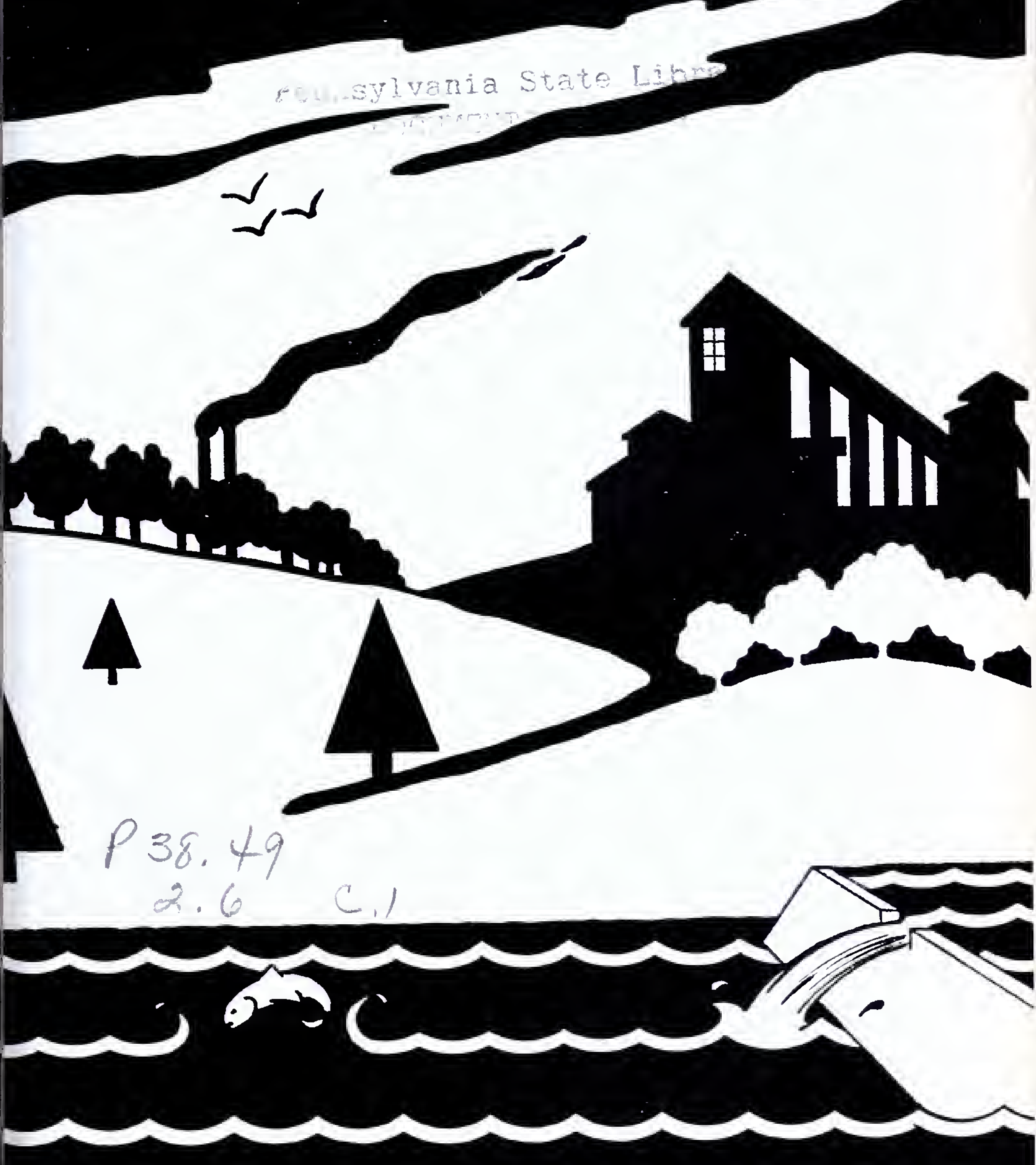
These publications may be seen in representative public libraries. A limited number of those listed are available for distribution until the present supply is exhausted. Those marked with an asterisk are now out of print.

The following issues of **Pennsylvania Planning** are still available.

Local Tax Rates, May-June, 1940.
Community Self-Appraisal (Revised Edition), April, 1942.
Planning and Zoning Progress in Pennsylvania, July, 1942.
Population, October, 1942.
Handicrafts in Post-War Planning, May, 1943.
Plastics, July, 1943.
Air Photographs, February, 1944.
Light Metals and Stainless Steel, August, 1944.
Topographic Mapping Needs, February, 1945. (For limited technical distribution.)
Community Action for Local Self Development, July, 1945.
Conservation, August, 1945.
Forest Resources, November, 1946.
Soil Conservation, September, 1947.
Minerals Conservation, December, 1948.
Know Your Pennsylvania, September, 1949.

EPORT AND PROGRAM
1950-1951

…sylvania State Libr



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STATE PLANNING BOARD
PENNSYLVANIA DEPARTMENT OF COMMERCE

NSYLVANIA PLANNING
HARRISBURG

JANUARY -- 1951
PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA

John S. Fine, Governor

PENNSYLVANIA DEPARTMENT OF COMMERCE

Andrew J. Sordoni, Secretary
William W. Behrens, Deputy Secretary

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Report and Program

1950 - 1951

Pennsylvania State Planning Board

Department of Commerce

Harrisburg, Pennsylvania

1951

The Pennsylvania State Planning Board was created by appointment of Governor Pinchot on July 23, 1934. Two years later it was established on a statutory basis as an independent administrative board by Act No. 32 of July 30, 1936, P. L. 81. Act No. 50 of May 10, 1939, changed its status to that of a departmental administrative board in the newly created Department of Commerce but made no change in the State Planning Board's duties.

In 1949, by several acts of the General Assembly, Nos. 485 to 491, inclusive, the State Board of Housing was consolidated with the State Planning Board and all of the powers of the Board of Housing were conferred upon the State Planning Board.

Concurrently the powers and duties of the Board were re-defined through the passage of the State Planning Code of 1949.

Pennsylvania Planning

To inform those who
are interested and
to interest others.

Issued by

PENNSYLVANIA DEPARTMENT OF COMMERCE
STATE PLANNING BOARD
Harrisburg, Pa.

Vol. 10 **January, 1951** **No. 6**

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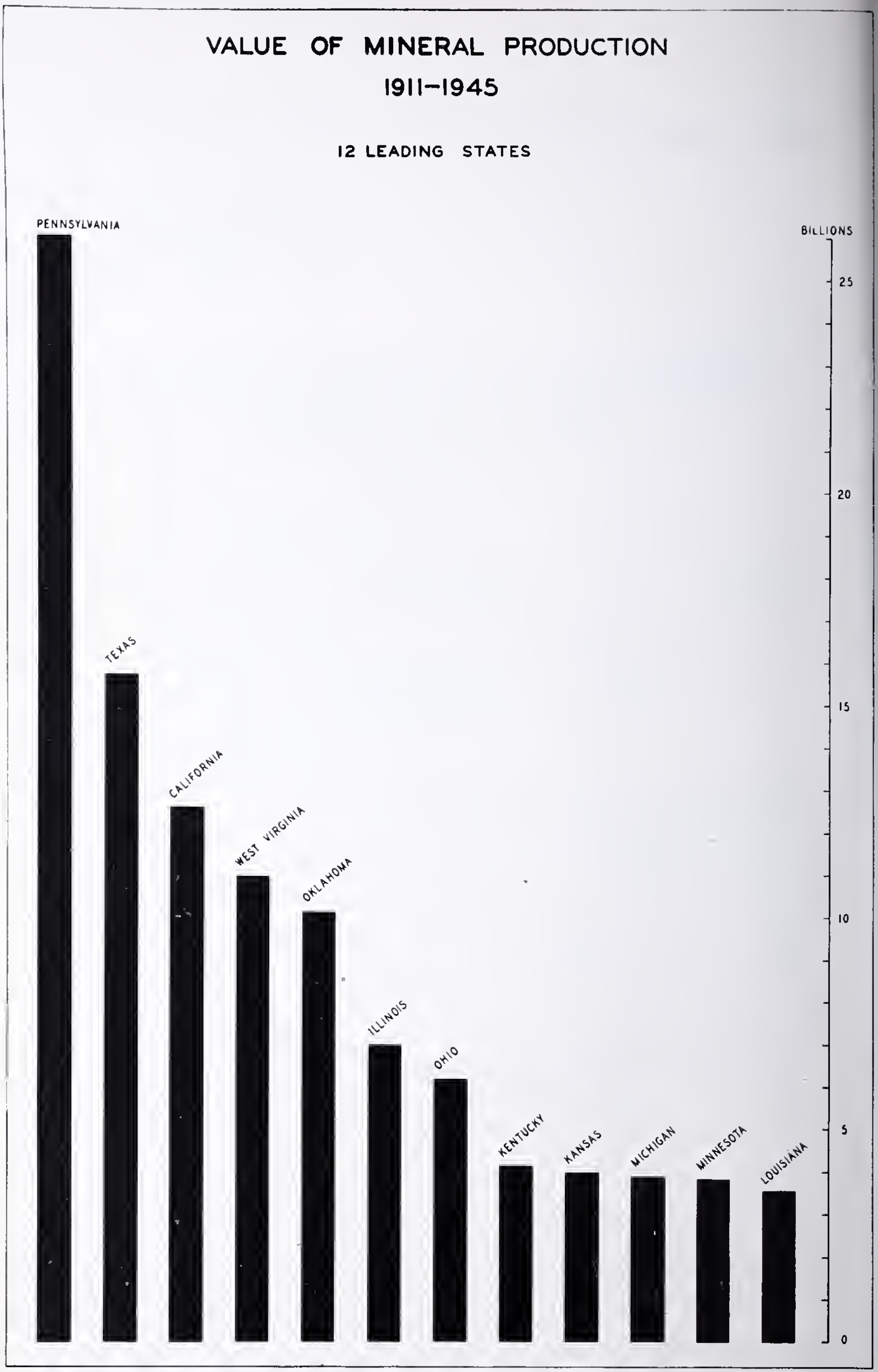


VALUE OF MINERAL PRODUCTION
1911–1945

12 LEADING STATES

DATA SOURCE U S BUREAU OF MINES PENNSYLVANIA DEPARTMENT OF COMMERCE STATE PLANNING BOARD

Pennsylvania leads all states in the total value of its mineral production in the Twentieth Century.

THE PENNSYLVANIA STATE PLANNING BOARD

Report and Program

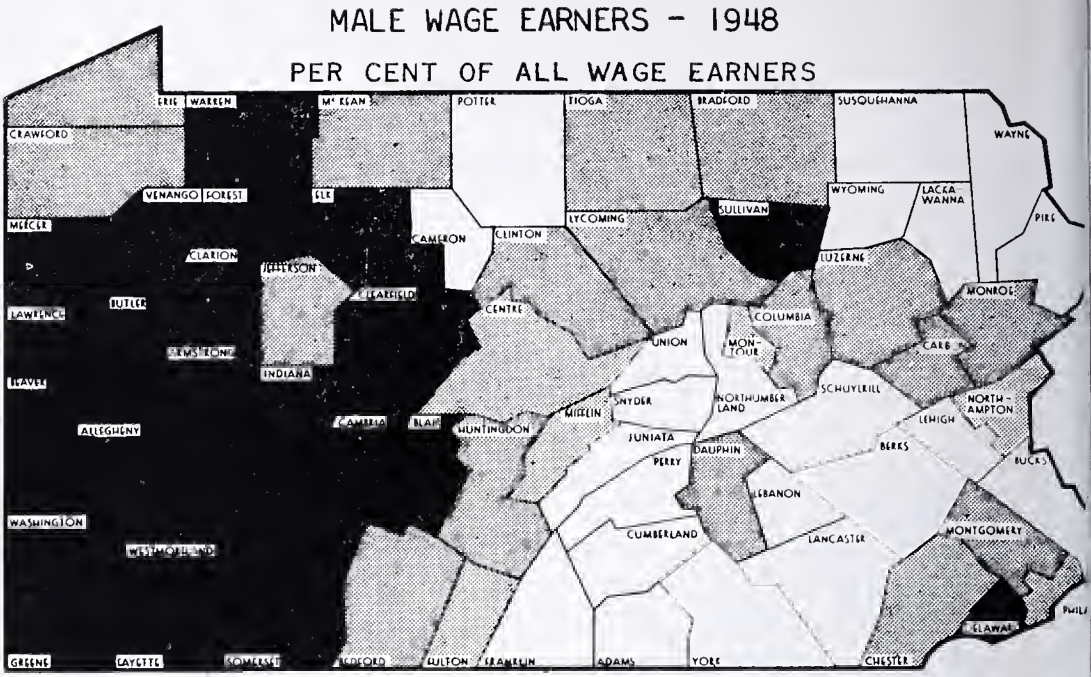
Research

The first specified duty of the State Planning Board, under the provisions of the State Planning Code (Act 485, 1949) is to conduct and stimulate research in regard to the State's physical, industrial and agricultural resources and their conservation and development. In this field, the staff of the Planning Board has undertaken to maintain from all available sources a continuous inventory of changes in population, income, employment, earnings, manufactures, agriculture, electric power, carloadings, bank debits and the production of coal, steel and iron, so that at any time the vital facts necessary to an estimate of the State's economic and social health may be available for the uses of the Department of Commerce or to guide the activities of the State Planning Board or other agencies of the State government requiring such information.

So far as possible, these and other data are also maintained on a county basis to provide background information for agencies of local government or for local economic development programs.

Condensed summaries of some sixty-five statistical series are published as an issue of PENNSYLVANIA PLANNING under the title, *Comparative County Data,* whenever changes in economic outlook justify a review of the comparative growth among the counties. The latest publication of these data was in August, 1950.

In a study of influences bearing upon the growth or decline of population in the counties of the state, or of the state itself, it is frequently necessary to compare series


MALE WAGE EARNERS - 1948

PER CENT OF ALL WAGE EARNERS

BLACK - 22 HIGHEST RANKING COUNTIES

GREY - 23 MIDDLE RANKING COUNTIES

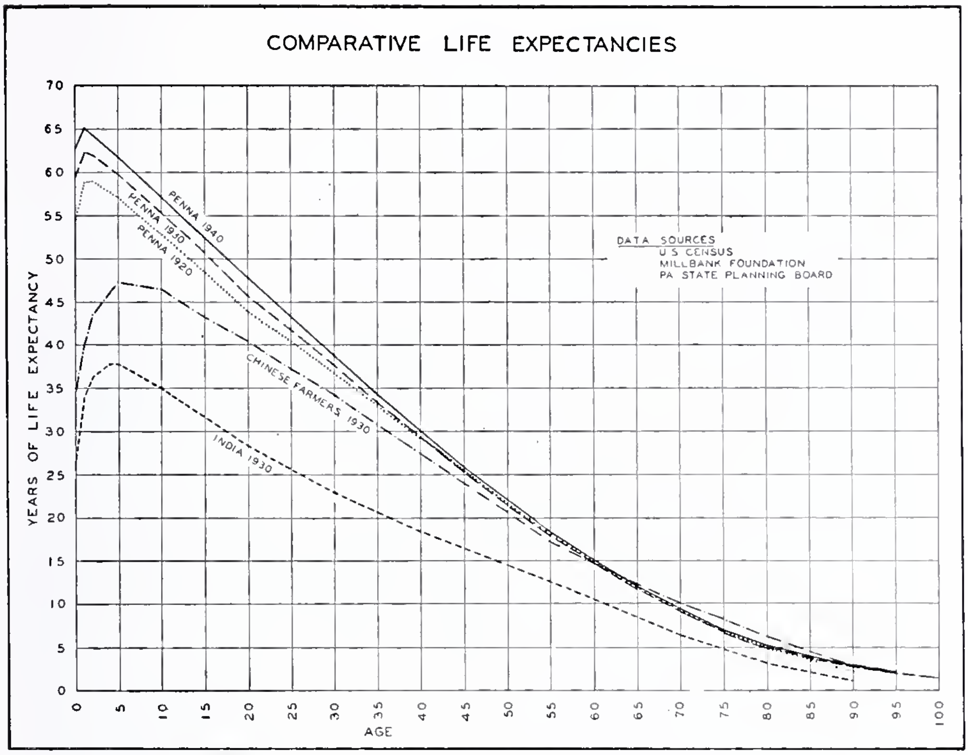
WHITE - 22 LOWEST RANKING COUNTIES

A striking contrast in employment by sex is shown in this map.

of data. The only reliable and mathematically sound method of determining factors influencing growth or decline has been the process of correlation. This is a lengthy and sometimes a quite difficult operation and a method has been developed by a member of the research staff which reduces the time necessary for such comparisons to a few minutes instead of many hours, with no sacrifice of accuracy.

These researches into the economic development of the Commonwealth have been used as a basis for a number of publications by the Department of Commerce and have enabled the Planning Board and the Department of Commerce to supply industrial inquirers with needed information on site locations.

Recent publications include issues of PENNSYLVANIA PLANNING entitled *Soil Conservation, Mineral Conservation, Know Your Pennsylvania, Comparative County Data,* and *Pennsylvania Anthracite.* The latter is a study



Pennsylvania's life expectancy has steadily improved.

of the problems of the hard coal industry and of means by which a demand for Pennsylvania's unique mineral product can be stimulated.

News releases dealing with a large variety of financial, economic and historically interesting facts concerning Pennsylvania, developed as a by-product of the staff researches, have been issued every week to all newspapers in the Commonwealth over a period of many years.

Parallel with the purely economic studies are other investigations into the State's population growth, which have developed a method of estimating the population in intercensal years. These population estimates by counties, issued biennially by the Planning Board for more than a decade, have been widely used by business information services as a basis for sales analyses and by State agencies requiring an estimate by counties of per capita costs or services. Over the past few years, the average error of these estimates as compared with later census reports has been less than one percent. A new method for arriving at longer range estimates has also been developed and applied to forecasts of the population of the State and also to that of certain areas, at the request of public utilities and other agencies interested in long-term development plans.

Present activities are being concentrated on developing methods for dealing with the complex factors influencing regional growth within the State and of acquiring and classifying information necessary to facilitate the participation of Pennsylvania manufacturers in supplying materials required for the National defense. As was done in the Second World War, a file is being maintained of primary contracts let to Pennsylvania companies, both as to location and type of industry, so that information may be provided to firms interested in subcontracts. Forms have been developed to assist Chambers of Commerce or other local agencies in maintaining an inventory of companies able to execute specific parts of military procurement contracts.

Local and Regional Planning Activities

By the legislation creating it, the Pennsylvania State Planning Board is directed to cooperate with county, municipal, and regional planning commissions, zoning commissions, park or recreation boards, community development groups and similar agencies created for the purpose of aiding and encouraging an orderly, productive and coordinated development of the State, and to encourage and assist in their creation. It is also directed to cooperate with planning boards and similar bodies of other states and of the Federal government, in formulating comprehensive regional plans and in the solution of regional problems. The Board is also empowered to cooperate with and enlist the support of civic bodies, corporations and individuals in the attainment of these and similar objectives.

Toward this end, continual effort has been made in the effective guidance of local planning and zoning activity. The Board has assisted hundreds of communities throughout the State in programs of local development and in the creation of local planning or zoning commissions.

The activation of interest in the local community by providing speakers, arranging meetings, and guiding local efforts in arousing public support for a planning program is an important phase of Board activity. Perhaps the best example of this activity was the State Planning Board meeting, held on February 2, 1950, at King of Prussia, to urge the creation of planning bodies, on both the county and regional basis, for the Philadelphia region, encompassing the counties of Philadelphia, Bucks, Montgomery, Delaware and Chester. These counties and other interested groups were represented at the meeting, and there were many expressions of concern over the need for comprehensive planning programs to deal with the problems arising from the extension of the Pennsylvania Turnpike into the area, and the proposed erection of a new steel plant in Falls Township, Bucks County, as well as conditions brought about by increased highway traffic and unprecedented population growth. The results have been extremely heartening. In April, 1950, the Montgomery County Planning Commission was appointed, and is now operating with a staff of four. In July, 1950, the Delaware County Planning Commission was given an operating budget and is now in the process of acquiring a technical staff. The Chester County Planning Commission, appointed in November, is in the organization stage. The Bucks County Planning Commission was created on January 9, 1951. Once the county planning bodies are all functioning, there is ample reason to believe that a regional organization will be established, thus completing the organizational requirements for planning in the Philadelphia suburban area, and fulfilling the aims and intent of the initial meeting at King of Prussia.

A similar meeting sponsored by the State Planning Board was held near Uniontown, July 25, 1950, in relation to the protection and preservation of the scenic and recreational values of the land surrounding the newly completed Youghiogheny Reservoir. Since the Reservoir extends into Maryland, representatives of townships, counties, and State departments from both Maryland and Pennsylvania were present. Interest was expressed in the establishment of local regulatory programs, but, as yet, no official action has been taken.

The continuing field work of providing technical assistance to enable local groups to organize and establish their programs, of meeting and talking to service clubs and civic organizations, of handling correspondence dealing with technical planning and zoning problems, of providing, on limited occasions, the actual work in connection with a particular phase of a local program, is carried on by two Planning Consultants on the staff of the Board.

A complete revision of Volumes I and II of the Board's series on "Planning and Zoning, Powers and Procedures" covering all civil subdivisions from Townships of the Second-Class to Counties and Regions was completed in

1949. In addition, Volume VI, "Subdivision Control" is complete in text and will be published after adding any necessary revisions stemming from legislative action taken at the forthcoming session.

A complete set of revised laws, dealing with planning and zoning at the various levels of local government is being prepared by the Board for consideration by the 1951 Legislature. The present legislation is ambiguous and confusing, especially at the Borough and Township level, and there is need for eliminating various conflicts between the powers granted to these two types of subdivision and the authority vested in County planning and zoning commissions.

Because of the increasing planning activity throughout the State, there is a growing need for a central clearing house for the exchange of information and technical data. This need, coupled with a desire on the part of the Board to arouse a wider interest in self-development activities among the State's communities, has made advisable the publication of a monthly newsletter entitled, "Pennsylvania Plans", which will first appear in January, 1951.

The number of Pennsylvania communities having planning or zoning activity, or both, has been increased from 231 to 360 within the past two years. The State Planning Board provides consulting service to many of these local planning agencies.

Air photographs provide an accurate basis for intelligent planning.

Housing and Redevelopment

Consolidation of the State Board of Housing with the State Planning Board by action of the 1949 General Assembly created new fields of responsibility for the Planning Board.

In the administration of the Housing and Redevelopment Assistance Law, under which the sum of fifteen million dollars was appropriated, the Board was empowered to make allocations to the various areas of the Commonwealth on the basis of population distribution, industrial trends, and evidence of housing needs. This was done and public notice given on June 1, 1949, two weeks after the passage of the law.

The Planning Board then entertained applications for housing grants from communities, housing and redevelopment authorities within these areas or from private contractors. It was stipulated that such proposals, to be acceptable, must have received approval of the local authorities and have provided evidence as to housing needs, the local enforcement of sanitary and building codes, and the existence of a suitable site on which housing could be constructed.

The Board then weighed all such applications on the basis of need within the areas, and allocated to each proposal which was deemed acceptable its share of the available funds.

After receiving bids on each project the Board then executed contracts with the successful bidders for the erection of housing, in which contracts it agreed to provide State subsidy as specified in the proposal bid, up to a maximum of thirty-five percent of all pre-occupancy costs, but insisted on suitable guarantees as to construction and operation during a twenty-eight year period, after which the interest of the State in such project will be extinguished.

The Board was authorized to allocate not more than thirty percent of the funds available under the housing appropriation for slum clearance and redevelopment, under proper assurance that the properties so acquired will be used for the construction of housing.

In carrying out its responsibilities under the State Housing and Redevelopment Assistance Law, the Planning Board has approved 34 housing projects covering a total of 3,060 dwelling units. Several of these projects cover construction in more than one location. The sum of $9,193,634 has been allocated to this phase of the program. Additional housing projects anticipated will require $990,749. A total of $4,410,241 has been allocated for redevelopment projects which will lead to housing construction in 13 additional areas.

The first housing which has been completed under this program is that located in the City of Butler, where the first tenant moved in November 15, 1950. The Butler homes were erected at a total cost of $860,000, of which the State contributed $295,000. They provide housing for 100 families at an average rental of $56.59.

Housing construction of projects so far approved will total a value of $29,640,494.87. The average rental to families occupying dwellings or apartments constructed or contracted for under this program is $55.73.

No discrimination as to race or color is permitted in any housing erected under this program. Veterans are given first priority, and second priority is allowed to persons displaced by housing or urban redevelopment operations.

Tenant admissions to such projects are limited to families whose total income does not exceed six times the rental value of the dwelling unit they are to occupy.

Summer in a Pennsylvania county park.

Recreation

Shortly before the outbreak of the Second World War, the State Planning Board, realizing the importance of coordinating the activities of State and local governments in providing healthful leisure-time opportunities for the people of the Commonwealth, invited representatives of several State departments and recreational associations to attend a meeting in Harrisburg, at which time an unofficial State recreational council was established. A subcommittee of this council, representing local recreational directors and various civic organizations, devoted its attention to problems of community recreation. During the war, these activities were suspended because of the pressure of other more urgent duties. It became evident, however, after the close of the war, that growing population pressure in many of our industrial communities and serious problems of public morale, compelled attention to the need for the development of local recreational programs.

In 1948 a Recreational Consultant was added to the staff of the State Planning Board. In 1949 a second technician was added. The Recreation Consultant's chief duty has been to provide assistance to local governments, at their request, on all matters pertaining to public recreation. Under his direction a survey of recreational facilities was established by the State Planning Board. It was discovered that, as of September, 1948, only 275 communities with a population of 5,179,000 persons had full-time or part-time recreational programs on which $2,239,235 was spent, or approximately 43c per capita of the population served. A similar survey compiled on August 15, 1950, points out the progress in public recreation achieved over the past two years. This second survey shows that in the Autumn of 1950, 437 communities with a population of 6,490,240 had active recreational programs, either full or part-time, that the local recreational budgets had increased by $1,100,000 and the personnel in charge of recreational programs was approximately 6,555 persons, nearly 3,000 more than were reported two years ago.

In 1948 a Pennsylvania Recreational Manual was compiled and published by the Planning Board and distributed to every State department, county, township, city, borough, school district and to numerous local groups. This manual supplied information as to the provisions of State law under which every type of community can organize and administer a public recreation program and offers an outline of procedures under which such programs can be set up and carried out. The Recreation Manual and the Digest of Laws Pertaining to Recreation were revised in 1950, to include changes in the laws passed by the General Assembly in 1949.

To assist in meeting the great need for trained recreation leadership as the best means of protecting the local investment made in areas, facilities and programs, a statewide training program was developed. The State Planning Board received the cooperation of the Public Service Institute in the Department of Public Instruction in carrying out this work. Nineteen of the twenty-five requests received for training programs were fulfilled during the months of April, May and June of 1950. Six hundred and seventy-one leaders from sixty-one counties enrolled in the nineteen programs of six sessions. Four hundred and sixty-three leaders completed the entire course.

Through the cooperation of many communities sponsoring recreation programs, the State Planning Board acquired excellent photographs from which were developed two State recreation exhibits for State and local use.

During the past two and one-half years the Board's recreation technicians have made 160 local service calls, have evaluated 85 local programs and have rendered assistance in regard to 45 recreational park site plans. They have provided recreation information or booklets in answer to approximately 600 inquiries from within or outside the State. They have served on 29 recreation conference programs in Pennsylvania and four in other states. They have conducted 22 training programs and institutes and have participated in the conferences of 33 committees on recreational planning.

Wallace Richards, a member of the State Planning Board and F. A. Pitkin, Executive Director of the Planning Board were appointed by the Governor as members of the State Recreational Committee to develop plans for the better coordination of state and local recreational services. Mr. Richards serves as Chairman of the Committee.

Quality of Water Studies

One further line of research has proved of particular importance during the Second World War and in the following years. This has been a research into the chemical character of the State's surface waters—a State-wide long-term investigation carried on by the State Planning Board in cooperation with the Pennsylvania Department of Forests and Waters and the United States Geologic Survey. The results of these analyses are published periodically by the State Planning Board and are made available to local authorities and to industries. They have proved of important use to local development agencies, to the United States Army and Navy and to the Pennsylvania Department of Commerce in its efforts to secure new industries for the Commonwealth.

Air Photography

The first program of air photography covering the entire area of Pennsylvania was authorized in 1939 at the instance of the State Planning Board. This project was finally completed in June, 1941, six months before the outbreak of the Second World War. During the progress of that war the existence of this complete file of photographs became an important means of expediting the location of war plants and military installations and enabled the Federal government, as well as local governing bodies and public utility companies, to lay out routes for highways, pipe lines, telephone and electric power wires and extensions of railroad rights of way. Private industry, in search of suitable locations for the manufacture of military and civilian goods found the air photographs of our Commonwealth to be invaluable.

Changes brought about by war and postwar industrial and civic developments have made the 1940 series of air photographs obsolete in most of the industrial areas of the State and improvements in the technique of air photog-

Coal strippings as seen from the air.

raphy have made it desirable and, in many cases, necessary, that the State should be rephotographed. The Planning Board therefore initiated a second program which has been financed by the Board, the Department of Highways, the Department of Forests and Waters, the Department of Mines and the U. S. Department of Agriculture. The current program includes the rephotographing of 39,500 square miles of Pennsylvania in 57 counties. Twenty-nine counties have now been completed, covering an area of 26,000 square miles.

These new air photographs are capable of greater enlargement than those of the original series and promise to be of even greater use to industry, to the government of the Commonwealth and to its civil subdivisions. They have been used by county authorities as a check on property boundaries, in locating tax delinquent land and in correcting errors on tax assessment maps.

The State Planning Board is the official custodian of these photographs, many of which would be released for public use only by authorization of the Defense authorities in the event of war.

Map Information Services

The State Planning Board has made a study of topographic mapping needs in Pennsylvania utilizing the advice of State and Federal agencies, as well as of public utility, transportation and industrial users of topographic maps. As a result of this study, recommendations as to future topographic mapping in Pennsylvania were developed. The entire mapping program, financed and directed by the State Topographic and Geologic Survey and the United States Geologic Survey, has followed closely the priorities and recommendations established by the State Planning Board's study.

Information concerning basic mapping programs is collected and made available to all map users. Many industries, public utilities and engineers contact the State Planning Board for map information. Copies of basic maps and air photographs are available for use in the Planning Board's office.

Numerous charts and maps have been prepared by the Engineering and Drafting Section of the Planning Board's staff for use in publications and for study purposes. Limited drafting assistance is given to other State agencies.

Supervision of State Grants

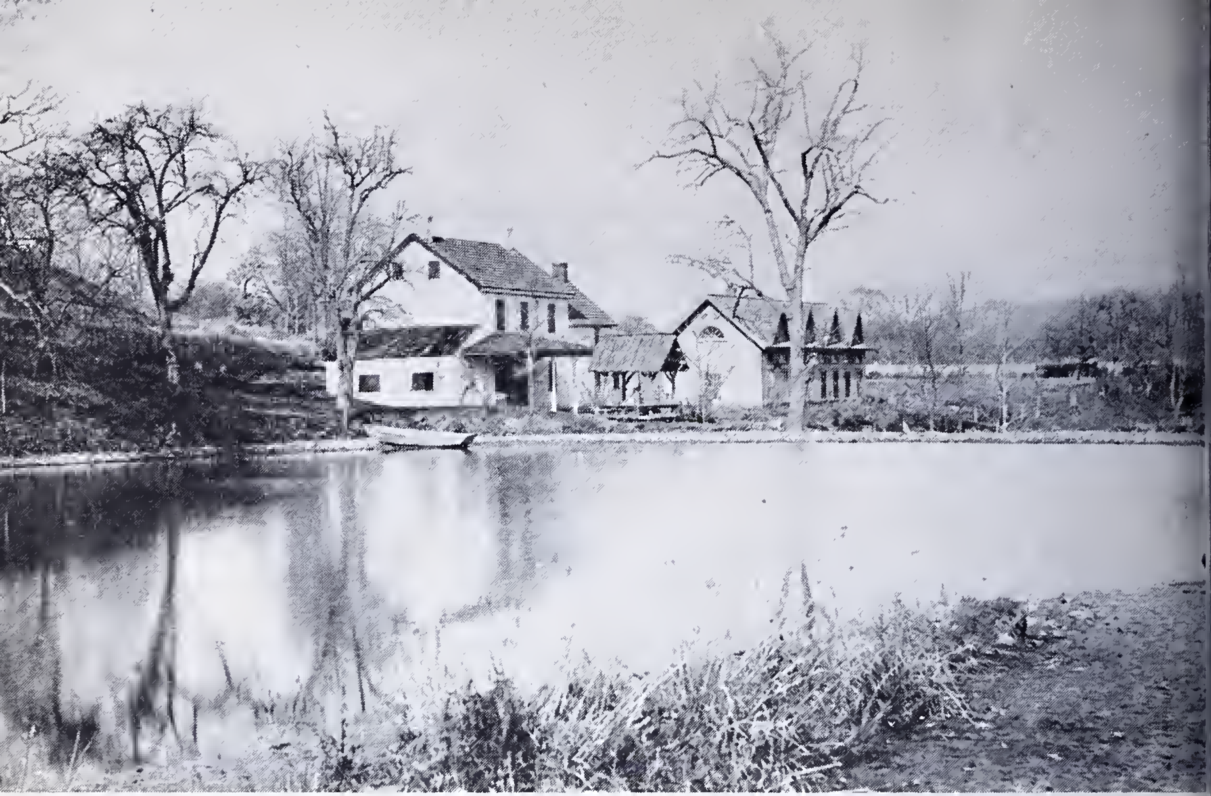
In 1947, the State Planning Board succeeded to the duties of the Post-War Planning Commission in regard to the administration of a fund of one million dollars to provide financial assistance to political subdivisions in preparing plans and specifications for public works. The technical examination of all such applications had been made by the State Planning Board for the Post-War Planning Commission from the time the appropriation first became available. Efforts of the staff have been directed toward the speedy ending of the program. As of December 5, 1950, $621,212.50 has been paid; $15,329.06 is being processed for payment; $209,131.43 has been allocated but not yet requested; and, $154,327.01 was not allocated or has been cancelled. It is felt that this program should be terminated as soon as possible, and every effort is being made to close up all outstanding projects.

The Capitol Park Extension Program

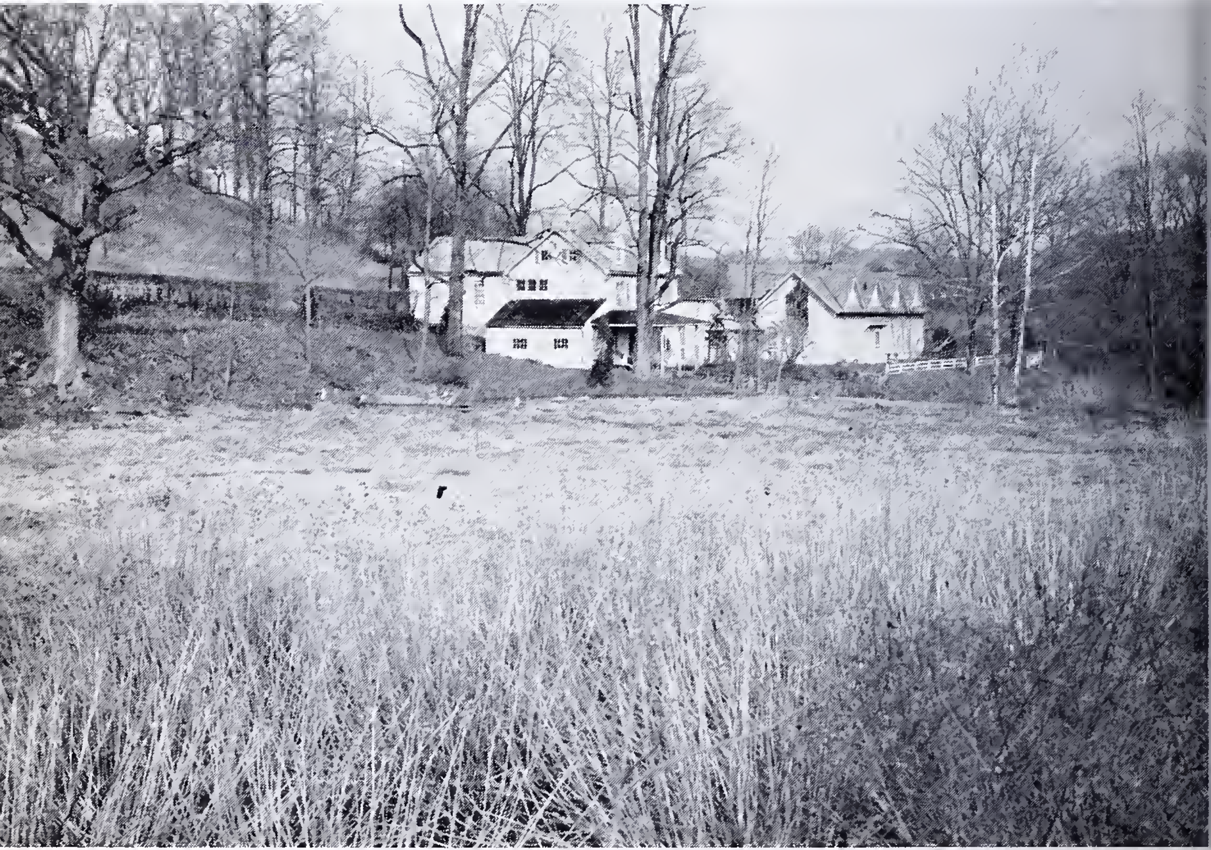
The original study of the proposed Capitol Park Extension was made by a subcommittee of the State Planning Board, as covered by a State Planning Board report of May, 1941. In the intervening years, during which legislative approval of the program was secured, the Planning Board has participated in various activities connected with this project.

Mr. George W. Reily, a member of the State Planning Board, is Chairman of the Capitol Park Extension Commission and of the Governor's State-City Planning Committee, of which the Executive Director of the Planning Board is also a member. The Director of the Planning Board is a member of the inter-departmental committee guiding the planning of the Capitol Park Extension Program.

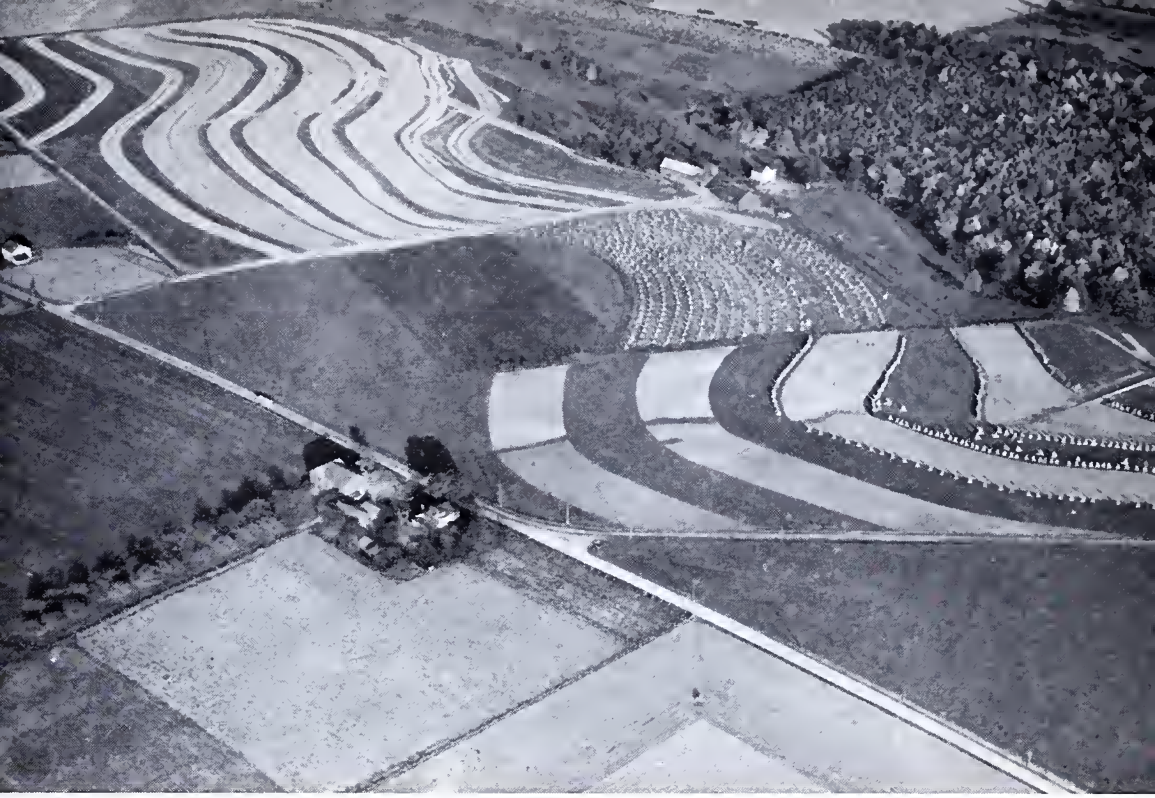
The City Planning study now being made in Harrisburg with the aid of the State Planning Board has been of material assistance in connection with plans for the Capitol Park development, particularly from the point of view of traffic circulation.



Top soil from neighboring fields



Has silted up the pond shown above and destroyed its usefulness.



Contour planting on a Pennsylvania farm.

Conservation

In addition to various publications on conservation already mentioned, the Planning Board has been active in the support of the Conservation Education Laboratory for Teachers, conducted annually in the summer months at The Pennsylvania State College. This Laboratory provides a training course designed to enable outstanding teachers in the State's public schools to present to their pupils first-hand information as to the State's natural resources and the need for protecting them. Two courses are conducted each summer session. The teachers applying for this work must be approved by their local superintendents of schools.

These training classes are supported, in part, by contributions from the Department of Forests and Waters, the Game and Fish Commissions and the State Planning Board and are supervised by officials of the Department of Public Instruction. Numerous women's clubs, sportsmen's clubs, service clubs and other organizations provide scholarships for attendance at these summer sessions.

Pennsylvania is noted for its scenic beauties.

Scenic Area Protection

The State Planning Board has continued its cooperation with the Pennsylvania Roadside Council and is represented on the advisory committee conducting the Blue Star Memorial Highway program.

The State Planning Board has participated in the program of the Scenic Area Improvement Committee which was established in 1940 by representatives of the organized outdoor advertising industry, petroleum interests and other roadside users. A number of Scenic Areas on major highways were selected and suitably marked, and the Field Representative of the Committee has been working since 1940 to secure the elimination of the outdoor advertising within the boundaries of these selected Areas. When the program was started in 1940 there were 19 such Areas, including approximately 210 miles of Pennsylvania highways. Since 1940, 3 additional Areas have been added, raising the total mileage to approximately 233 miles. This program has resulted in a reduction of advertising signs in the original Scenic Areas from 2,079 in 1940, to 368 in September, 1950.

While this record reflects a considerable progress in restoring these limited Scenic Areas through voluntary cooperation, it must be recognized that after ten years of effort not a single one of these Areas is completely free of misplaced advertising, and it is obvious that a complete solution to the problem of protecting the State's scenic areas and memorial highways has not yet been reached. Further and more intensive efforts must be made if the roadsides along our older scenic highways and along the new sections of modernized multi-lane highways are not to become commercialized to an extent that will prove detrimental to the interests of the Commonwealth.

As a result of this experience, the State Planning Board in 1949 sponsored legislation which would have created a State Roadside Zoning Commission with authority to zone the borders of State highways in the immediate vicinities of State Parks and Roadside Rests and also along the Blue Star Memorial Highway. This legislation was not enacted. In the 1951 legislative session the State Planning Board will again propose such protective legislation.

Meanwhile, in the absence of effective roadside protection through either voluntary cooperation or State regulation, the State Planning Board is making every effort to stimulate local planning and zoning activities so as to protect our scenic resources and to preserve the safety and traffic-carrying capacity of our highways.

Interstate Cooperation

The State Planning Board has continued its activity in the field on interstate cooperation, supplying general consulting service to the Pennsylvania Commission on Interstate Cooperation and taking an active part in interstate programs involving fields of interest to the State Planning Board.

The Executive Director of the Board is serving as Chairman of the Interstate Commission on the Delaware River Basin and is a member of technical committees of the

Interstate Commission on the Potomac River Basin. He has been active in the national Association of State Planning and Development Agencies, having been a member of its Board of Directors since its inception and serving as its President in 1949-50. He and the Assistant Director of the Board's staff have taken an active part in the programs of the Northeastern States Industrial Development Conference.

Information Service

During the past biennium over 3,000 requests for information have been received and serviced. While some of these requests were obviously from school children in our own and other states, and could be answered with material already available, other inquiries from business publications, industrial firms, Chambers of Commerce, State agencies and commercial representatives in foreign countries required special research. Letters requesting advice as to possible residential, industrial or commercial locations were received from firms and individuals in many states. An effort is made to answer all such inquiries promptly and adequately.

Many thousands of copies of the Department's publications were also sent out in response to special requests. A large number of the inquiries serviced related to sources of manufactured goods or raw materials which firms in Pennsylvania or other states desired to purchase in the Commonwealth.

In the course of each year, many articles are written descriptive of Pennsylvania, its resources and its activities, for publication in periodicals and works of reference.

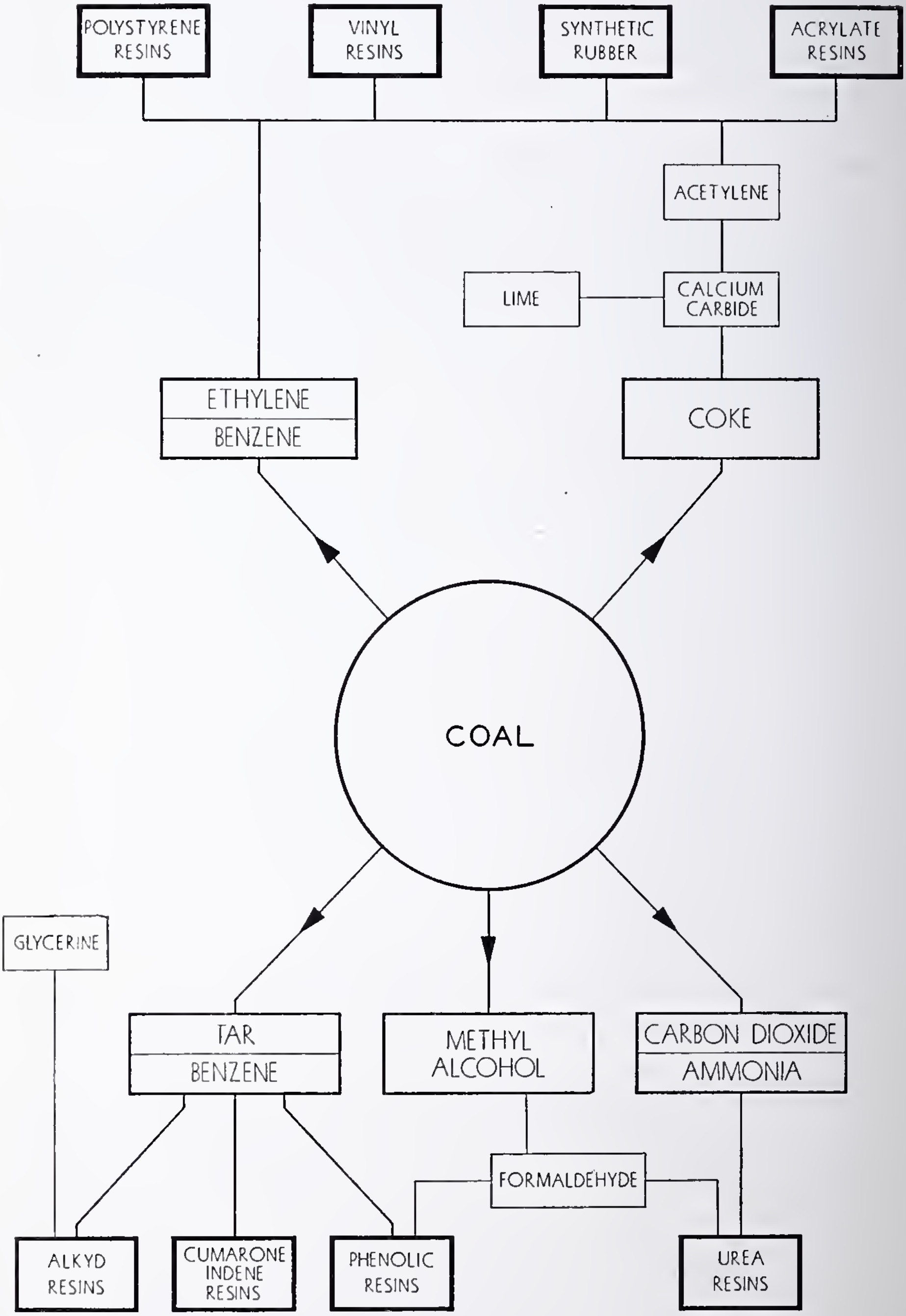
The Engineering Section of the State Planning Board provides information as to air photographs, maps, land use and all the physical features of our State, including the quality and flow of water, as previously mentioned, and has prepared a large number of maps and other graphic presentations for the Planning Board, the Department of Commerce and various State agencies. It also provides technical advice in regard to industrial locations.

Classified Data Service

An average of six hundred publications are received, classified and filed each month. An ever increasing number of requests are received from other State departments, legislators and city and county governments for the material that can only be obtained from the files of the Planning Board's Library. The staff members call upon the Library for much of the material used in their researches and in preparation of their many reports.

The State Planning Board has been designated as the official repository for all Census publications and has accumulated from all available sources material bearing upon the resources, problems and potentialities of the Commonwealth.

A FEW PLASTICS DERIVED FROM COAL



A DIGEST OF THE PENNSYLVANIA PLANNING CODE

POWERS AND DUTIES

Under the State Planning Code, the 1949 amendment of the State Planning Board Law, the Board's principal powers and duties are:

To conduct and stimulate research and to collect, compile and analyze data bearing upon all industrial, commercial, social and physical factors which may influence the welfare of the State;

To prepare plans or programs for the physical and economic development of the State;

To prepare and maintain a long-term development program of all major State improvement projects;

To cooperate with county, municipal and regional planning commissions, zoning commissions, park or recreation boards and similar agencies and to encourage and assist in their creation;

To cooperate with agencies of other states and of the Federal government in forming comprehensive regional plans;

To collect, analyze and publish information relating to the conservation and development of the State's natural resources and to make recommendations on such programs to the Governor;

To study housing conditions and needs throughout the Commonwealth and to devise ways and means of eliminating conditions of bad housing;

To suggest and assist in the preparation of legislation relating to housing conditions and needs, building codes, health and sanitation standards and to advise and assist municipalities in the preparation of ordinances in this field;

To develop, administer or assist in the administration of any State program for the provision of housing;

To exercise over housing authorities and redevelopment authorities and their projects, such supervision as is provided for by law;

To cooperate with local or regional housing officials, agencies or authorities as well as those of other states and the Federal government.

The Board is also authorized to advise and cooperate with all State departments, with local authorities and individuals, and with all Federal, regional, State and local planning agencies. It may request from all these as well as from all other agencies of the Commonwealth or its political subdivisions such available information as may be required in its work.

All State departments, divisions and officials are required to submit for the consideration of the State Planning Board all plans for all long-term improvement projects, when first taken under consideration by the department or authority, and while still in a preliminary form.

Public hearings may be held by the Board, or any member thereof, when authorized to do so by the Board. In conducting such hearings, the Board or Board member may administer oaths and take affidavits.

The State Planning Board is empowered to exercise the right of eminent domain in any city or county in which the Board has approved the initiation of a housing or redevelopment project.

All housing authorities in the Commonwealth are required to submit to the State Planning Board any applications for financial assistance from the Federal government in connection with a housing project and to file with the State Planning Board copies of all agreements and documents exchanged between the Authority and the Federal government in connection with such a project. Housing authorities must also file each year a report of their activities for the preceding year and copies of all plans, costs and proposed methods of financing.

Ordinances authorizing the formation of urban redevelopment authorities must be filed with the State Planning Board and also an annual report of all activities of such authorities. Similar provisions govern the activities of limited dividend housing companies.

COMPOSITION OF BOARD

The State Planning Board consists of the State Secretary of Commerce as the Chairman of the Board Ex-officio and fifteen members appointed by the Governor from among the citizens of the State, who during their terms shall hold no other State office to which any salary is attached. The Governor may appoint as additional members of the Board, executive officers of State administrative departments or agencies, judges, officials of State agencies or authorities or members of the General Assembly, for such terms as he may determine, but not beyond their term of office in such other State service. The term of office of citizen members of the Board is five years, except that provision was made that some of the first appointments should be for shorter periods so that at no time will the entire membership of the Board be changed simultaneously.

STAFF

The Board, with the approval of the Secretary of Commerce, appoints and fixes the compensation of a secretary who acts as executive director of the Board and conducts the work of the Board under its supervision. The secretary cannot hold any other position in the service of the Commonwealth, or any subdivision thereof, and he must be technically qualified for the duties of his office.

The Planning Board is empowered to employ such technical and clerical assistants as may be required, and the head of any department or agency of the State government, or any political subdivision of the Commonwealth is authorized to assign technical employes to assist the Board.

ADDITIONAL POWERS CONFERRED BY LAW

Provisions of the County Zoning Enabling Act (P. L. 2129, 1937) give to the State Planning Board the power of review over proposed county zoning ordinances or amendments thereto. In such cases the State Planning Board's recommendations are advisory only.

Under the provisions of Act 567 of the 1947 Session, zoning commissions of second-class townships are authorized to consult with the State Planning Board in regard to the development of township zoning ordinances.

Under the provisions of Act 186 of the 1947 Session, all of the powers conferred on the Post-War Planning Commission as to agreements with political subdivisions for the financing of public works planning were transferred to the State Planning Board to carry out obligations covered by agreements made prior to May 31, 1947.

Under the provisions of Act 493 of the 1949 Session, the State Planning Board was charged with the administration of the Housing and Redevelopment Assistance Law, which provided an appropriation of $15,000,000 to the State Planning Board to assist in energizing construction of rental housing for families of moderate income and for assistance to local slum clearance and redevelopment programs.

SELECTED PUBLICATIONS OF THE PENNSYLVANIA STATE PLANNING BOARD

Publication
No.

*1—Preliminary Report. 682 pages. 152 charts, December, 1934.

*10—Drainage Basin Study. 3 vols., 611 pages, 1937.

15—Recent Industrial Trends and New Employment Opportunities in Pennsylvania.

16—Retail Trade in Pennsylvania, 1946.

17—Industrial Utility of Water in Pennsylvania. Chemical Character of Surface Water, 1944 to 1946, 1947.

18—The Pennsylvania Zoning Primer (Revised), 1948.

19—Local Powers for Community Development, 1948.

20—A Pennsylvania Recreation Manual, 1949.

21—Planning and Zoning Powers and Procedures in Pennsylvania, 1949. Vol. 1. (Townships of the Second Class, Counties, Regions.)

22—Planning and Zoning Powers and Procedures in Pennsylvania, 1950. Vol. 2. (Cities, Boroughs, First Class Townships.)

These publications may be seen in representative public libraries. A limited number of those listed are available for distribution until the present supply is exhausted. Those marked with an asterisk are now out of print.

The following issues of **Pennsylvania Planning** are still available.

Local Tax Rates, May-June, 1940.
Community Self-Appraisal (Revised Edition), April, 1942.
Planning and Zoning Progress in Pennsylvania, July, 1942.
Population, October, 1942.
Handicrafts in Post-War Planning, May, 1943.
Plastics, July, 1943.
Air Photographs, February, 1944.
Light Metals and Stainless Steel, August, 1944.
Topographic Mapping Needs, February, 1945. (For limited technical distribution.)
Community Action for Local Self Development, July, 1945.
Conservation, August, 1945.
Forest Resources, November, 1946.
Soil Conservation, September, 1947.
Minerals Conservation, December, 1948.
Know Your Pennsylvania, September, 1949.
Comparative County Data, August, 1950.

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